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TECHNOLOGY & SCIENCE

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On With

The New

On 3 May 1968, with the issuance of OPNAV Notice 5450, a new safety organization was established under CNO—the NAVAL SAFETY CENTER—which combined the former Aviation Safety Center and Submarine Safety Center. Effective at the same time was the establishment of the Office of the Assistant Chief of Naval Operations (Safety).

These events are some of the results of recommendations of a recent SECNAV study group, which reviewed the Navy Department Safety Program. The NAVAL SAFETY CENTER will also develop safety programs for surface ships and shore (field) activities in the near future.

The mission of the NAVAL SAFETY CENTER is as follows:

1. To collect and evaluate information pertaining to safety, publish statistical data concerning accidents, maintain a repository for accident and safety reports, maintain direct liaison with all levels of command within the Navy and other government and private agencies engaged in safety work and other aspects of the Department of the Navy Safety Program in order to advise and assist the Chief of Naval Operations in promoting and monitoring safety and the prevention of accidents;

2. Initiate and conduct informal investigations into all phases of safety to develop information to make recommendations for the formulation of safety policy necessary to maintain the highest practical level of combat readiness.

Editor's note—Shortly after receiving this excellent article on spins, the Editor was invited to the U. S. Naval Test Pilot School, Patuxent River, Maryland for an accelerated course in Spin Training. Commander D. Z. Skalla, Assistant Director of TPS, acted in the capacity of instructor and safety pilot. The Editor, not having intentionally spun a jet aircraft for many years, thoroughly enjoyed the opportunity to participate in this eye-opening flight.

An instrumented T-1A Seastar *was utilized for this particular spin indoctrination training flight. Some 10 spins and post-stall gyrations were completed, including various modes of entry into the classic varieties of the normal and inverted spin.*

As Commander Skalla brings out graphically in his article, the post-stall gyration that may ensue in the transitory stage just prior to entering the spin is indeed a wild ride. Without doubt this violent maneuver could be responsible for the pilot prematurely abandoning his aircraft, based on his, the pilot's, unfamiliarity with his aircraft's highly unusual behavior in this totally different flight regime. Spinning an aircraft and correctly recognizing the situation is one thing but to violently tumble about the aircraft's lateral axis or cartwheel is an entirely different matter and one difficult to accept as possible.

A New Look at the Inverted Spin

CDR D. Z. Skalla
Chief Flight Instructor
U. S. Naval Test Pilot School

Inverted spins have always provided an interesting and frequently spectacular realm of flight; however, it is also a realm of relative unfamiliarity to most pilots. It has been well documented that spins cannot be prevented by a handbook entry that "intentional spins are prohibited." Also, inverted spins cannot be prevented by handbook entries that "the airplane resists inverted spins." Someone will always find a way to end up in uncontrollable flight. Because of this, spin testing, including inverted spins, will always remain an important part of the test program for new tactical airplanes, and spin training should be an important part of pilot training syllabi.

During the past three years, the staff of the U. S. Naval Test Pilot School (TPS) has been taking a new look at inverted spin testing techniques, with emphasis on entry variations and their effect on the spin characteristics. Some of the results have been both colorful and educational. For example, I'll have to be "shown" before I'll believe that any airplane will *not* spin inverted.

First, it should be clarified that most of the investigations and findings that this article is based

on were obtained in the Lockheed T-1A jet trainer. However, many of the characteristics should be equally pronounced, probably more so, in our current high inertia tactical aircraft.

The program at the TPS has verified what, I am sure, we all knew anyway—the inverted spin is indeed a disorienting maneuver for pilots inexperienced in spinning, particularly if entered unintentionally or unexpectedly. It's much more disorienting than the erect spin, but why? The answer is simply "inverted, negative G flight is just naturally disorienting" but there is much more to it than this.

The first disorientation may evolve from inability to determine if the spin is erect or inverted. The usual pilot-reader reaction to this statement is probably "hogwash"; any competent pilot can tell whether he is inverted or erect—if his rear is planted firmly on the seat, he is erect; if he is hanging in the straps, he is inverted. True, (but qualified) and for a few classic spinning airplanes, no problem. But take an airplane that spins in a steep nose-down attitude both erect and inverted and the problem isn't as readily resolved. Now, take an airplane in which the nose pitches erratically in both erect and inverted spins, and eyeball and seat-of-the-pants cues become rather confused. The other disorienting aspects arise in determining the direction of the spin. Again, minimum confusion in the classic spin in which yaw rate is predominant and nose attitude in relation to the horizon is relatively constant. But, throw in an increased roll rate or roll gyrations, and—*tilt*. This confusion or disorientation arises because, in an inverted spin, roll rate is opposite to yaw rate; consequently, the airplane will be rolling opposite to the direction of the spin, as viewed by the pilot. A pronounced tendency exists for pilots not well versed in inverted spins (normal types also) to analyze spin direction in the direction of roll, instead of in the direction of yaw. The tendency becomes more pronounced as the roll rate becomes more predominant. This problem does not exist in erect spins, since in the erect case, yaw and roll rates are in the same direction.

These disorienting characteristics should convince us that we must have reference to something other than the seat-of-our-pants and the ground if we are to consistently apply correct recovery controls. Spin direction can be determined from the turn needle, which will always be deflected in the direction of yaw rate regardless of the spin mode. The angle-of-attack indicator, in airplanes so equipped, provides the most reliable solution to the inverted or erect question—"two-blocked" negative for inverted, "two-blocked" positive, or beyond the stall index, for erect. In airplanes not equipped with angle-of attack systems, the inverted or erect determination must be made using sensory cues or the accelerometer. *It should be noted that the accelerometer is of little more value than the pilot's seat-of-the-pants in determining the inverted from the erect spin mode*—it is in fact reliable only in the classic steady state spin.

Spin Entry Techniques

Conventional Entry—The conventional method of entering an inverted spin consists of stalling the airplane inverted and applying pro-spin controls. If the inverted stall cannot be achieved due to inadequate elevator effectiveness, pro-spin controls are applied as the nose begins to fall through with full forward stick. Pulsing the rudders back and forth during deceleration may be somewhat effective in aggravating the yaw at spin entry. This conventional entry involves primarily the use of aerodynamic forces to enter the spin, although some inertial effects may also be present. In the case of the elevator limited airplane, an inverted spiral vice the inverted spin may result, and some airplanes simply will not spin inverted using this entry technique.

Recovery controls will vary for different airplanes but will always include full rudder opposite to the spin direction (opposite to turn needle deflection). Unlike erect spins in many of our current airplanes in which the rudder is only marginally effective in spin recovery, the rudder in an inverted spin will (except possibly for a few T-tail types) be highly effective since it is in "clean airflow," *i.e. undisturbed by the wing, fuselage and horizontal tail.* This is illustrated in Figure 1. However, this should not be misinterpreted to infer that any airplane can be recovered from an inverted spin by use of opposite rudder only. Anti-spin aileron is required in many high inertia types.

Roll Coupling Entry—The T-1A is an example of

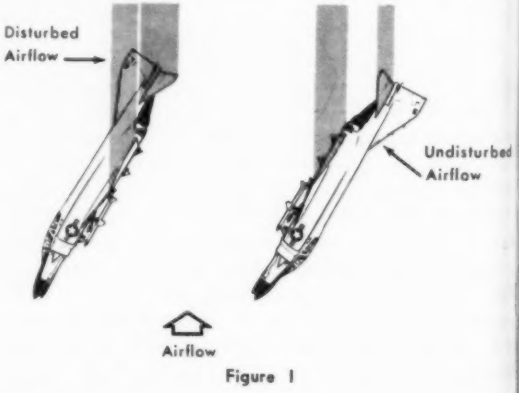


Figure 1

an airplane that is somewhat limited in elevator effectiveness in inverted flight and attempts to spin it inverted using conventional entry techniques often meet with failure, i.e. inverted spiral vice the inverted spin. However, the same airplane spins inverted very readily using a rolling entry, executed in a manner to take advantage of inertial coupling moments in pitch.

Use of inertia characteristics for spin recovery in high performance jet airplanes has been commonplace for years. In fact, most supersonic and many subsonic airplanes will not recover from a steady state spin unless recovery inertia moments are generated in yaw to augment weak aerodynamic yawing moments produced by the rudder. It logically follows that inertia coupling can be used for spin entry. For the T-1A, the desired coupling moment is in pitch to compensate for limited inverted flight elevator effectiveness. The simplified equation of motion in pitch is:

$$q = \frac{M}{Iy} + pr\frac{(Iz - Ix)}{(Iy)}$$

q = pitch acceleration
p = roll rate
r = yaw rate
q = pitch rate
M = aerodynamic pitching moment
Ix = moment of inertia in roll
Iy = moment of inertia in pitch
Iz = moment of inertia in yaw

Analysis of the inertia term, $pr\frac{(Iz - Ix)}{(Iy)}$, in the equation reveals that roll rate opposite to yaw rate (opposite signs) produces a negative or nose-down pitching moment since Iz — Ix is always positive. This pitching moment then is in the desired direction for an inverted spin entry. Now it can readily be seen that if the spin is entered with some roll momentum opposite to the direction of yaw, or spin direction, nose-down (negative) aerodynamic pitching moments, as viewed from the cockpit, are augmented with inertial coupling effects.

For clarification, this entry is explained step by step below for a left inverted spin in the T-1A:

(1) Establish a nose-high (30-40 degrees) attitude.

(2) At 130 KIAS, apply full right aileron to roll the airplane inverted.

(3) At the inverted position, simultaneously apply full forward stick and full left rudder.

It is important that the roll be made opposite to the direction of the intended spin, i.e. right roll for a left spin and left roll for a right spin. Roll in the direction of spin will have the opposite effect and produce pitching moments in the wrong direction.

Exaggerated Yaw-Roll-Pitch-Coupling Entry, Stick Aft—This type of spin entry was first experienced by the author during a spin demonstration flight in the British *Hunter*, a transonic jet fighter, while visiting the Empire Test Pilots' School in England. It again involves making use of inertia coupling characteristics to force a normally inverted spin resistant airplane into an inverted spin. The entry consists of rolling the airplane to build up roll momentum and adverse yaw and then applying pro-spin controls opposite to the direction of the roll. Timing of control inputs is very important and will vary for different airplane types. The interesting aspect of this entry is the fact that the inverted spin is achieved with the control stick full aft; thus aerodynamic pitching moments created by the elevator are completely overcome by inertial pitching moments.

The *Hunter* simply flips into a classic inverted spin from this entry, even though the stick is held full aft. The T-1A reacts alarmingly different—the inverted spin phase is usually preceded by extremely violent post-stall gyrations, predominantly the uncomfortable negative G type. These gyrations consist of erratic, rapid changes in pitch, roll and yaw. The rotational energy from the maneuver apparently couples from axis to axis until the inverted spin finally develops—again with the stick full aft. The gyrations are rather difficult to keep track of, and bring the usual scientific exclamations from the pilot. Some that have been noted are:

(1) End over end tumbles in pitch, both positive and negative.

(2) Wing tip over wing tip tumbles in yaw.

(3) High roll rates.

(4) Mixed combinations of the above.

(5) "You name it, I don't know what it did!!"

These gyrations produced two pilot reactions the first time they were encountered: (1) "I don't believe it—this can't be happening in a good old honest, forgiving T-1A," (2) "Good grief! I've broken the airplane." The first reaction was dispelled after the first few turns, and careful post-flight examination dispelled the second. Subsequent investigation revealed that the gyrations occur at very low airspeeds with insufficient dynamic pressure to cause structural damage. However, the negative G limits have been pressed on occasion, usually from improper entry or recovery techniques.

Once the initial inverted spin phase is attained,

it is characterized by a higher roll rate than that achieved from more conventional entries. This high roll rate opposite to the direction of the spin has proved to be extremely disorienting even to pilots experienced in inverted spins. The roll is so predominant, the natural tendency is to analyze the direction of the spin as being in the direction of roll instead of in the direction of yaw. In addition, the high side forces combined with negative G during the post-stall gyration phase add to the disorientation problem. This maneuver is guaranteed to erase all doubts about the value of the turn needle in determining spin direction and leaves considerable doubt about pure eyeball/seat-of-the-pants cues.

Entry and recovery techniques for this colorful spin mode in the T-1A are outlined below for a left inverted spin:

(1) Establish a nose-high attitude (20-30 degrees).

(2) As airspeed decreases to 140 KIAS, apply full right aileron and a slight amount of left rudder (the rudder effectively increases adverse yaw).

(3) Upon completion of a 360 degree roll, simultaneously apply full left rudder and pull the stick into the aft right corner.

(4) Hold on.

(5) Maintain pro-spin controls until the inverted spin develops.

(6) Recover with full right rudder, neutral aileron, and aft stick. CAUTION: If the stick is not held full aft until rotation is stopped, the negative G limits may be exceeded.

Although in the T-1A, the inverted spin mode is usually attained using this entry, occasionally a normal erect spin develops. This has been attributed to improper control input timing or inability to hold the desired control position during the violent post-stall gyration phase.

Inverted spins, with post-stall gyration and entry characteristics very similar to the yaw-roll-pitch coupling spin entry, have been obtained frequently in the T-1A from conventional vertical stall spin entries (80 degrees pitch attitude with erect pro-spin controls applied—stick full aft, neutral aileron and full rudder). Invariably, this spin mode is precipitated by roll opposite to yaw developing during the initial post-stall gyration phase. Due to the steep airplane attitude on entry, the gyrations occur at very slow airspeeds where the inertia effects are strong in comparison to the aerodynamic effects. However, the airplane continues to spin inverted with the stick full aft even after airspeed increases to near stalling speed. This again emphasizes the significance of the powerful pitching moments created by inertia coupling, and the relative unimportance of longitudinal stick position in spinning modern high inertia airplanes. Obviously if, during the vertical spin entry, roll fails to develop or develops in the direction of yaw, a normal erect spin results.

Not all airplanes will spin inverted using the stick aft entry technique—for example, the T-2B will not. Although the T-2B spins inverted quite readily using conventional entries, the exaggerated yaw-roll-pitch coupling technique was unsuccessful. This is attributed to two factors:

(1) Insufficient lateral control effectiveness at slow speeds to attain sufficient roll momentum and

(2) Strong dihedral effect which stopped the roll rate when rudder was applied.

Application to High Performance Airplanes

Although this coupling entry in the T-1A requires rather unusual and exaggerated as well as properly timed control inputs, it's reasonable to assume that similar spin entries could be achieved in many of our high inertia fighter and attack airplanes with much less control manipulation. For example, take the fighter pilot who through a lapse of skill or judgment finds himself on the defense and is maneuvering to throw his adversary to the outside of a slow speed turn. Assuming he succeeds, he must reverse his turn rapidly at the appropriate time. At this point, he is pretty well set up for a yaw-roll coupling departure or spin—particularly if he was a little late in taking out that inside rudder that he was using to increase the turn rate.

Perhaps many of the unsalvaged departures and spins from which pilots have used "Martin Baker recoveries" were attained under similar conditions and perhaps the reason for the unsuccessful airplane recovery was incorrect analysis of spin direction or spin mode (erect or inverted). The operational pilot has a "need to know" the spin entry, the spin, and the spin recovery characteristics of his machine if he is to press it to the limits of the operational flight envelope in tactical situations. To recognize these characteristics, he should receive adequate spin indoctrination in an "honest spinning" jet airplane somewhere in his training cycle.

CDR Skalla, a graduate of the TPS (Class 25) and a member of the Society of Experimental Test Pilots, is currently Assistant Director and Chief Flight Instructor at TPS. He has been instructing in spin testing and giving spin demonstrations to student pilots for three years at TPS. As a flight instructor in VF-124 in 1959, he acquired his first knowledgeable experience in spinning jet airplanes by giving spin indoctrination flights in the TF-9 to "*Crusader* College" students. He is indebted to LCDR John Humphreys, Empire Test Pilot's School Staff, for his first introduction to inertia coupling spin entries in the *Hunter*, and to Mr. Tom Moore, TPS Staff, for technical assistance in explaining and analyzing the colorful spin modes in the T-1A.

THE JUDGMENT FACTOR

By LtCol F. E. Allgood, USMC

Safety has been an integral part of naval aviation for years. As such we have initiated safety programs, put up posters and conducted safety drives. But today, with many months of combat behind us in Vietnam, we are faced with a different safety need. True, we have the latest safety devices devised by man and we engineer safety equipment as an integral part of our flying hardware. We also publish magazines and handouts regularly. All of these serve to assist in the development of safety awareness.

But here in Southeast Asia, naval aviators are faced with an acute need for high level judgment. An aircraft will react the same way in combat as in peacetime since it doesn't know that it is in danger of being shot down. But the pilot does!! All the training possible can not really prepare an aviator for that first rocking motion and the smoke and hydraulic fluid in the cockpit. Consequently the environmental conditions inherent in combat today in Vietnam increase still further the pilot's need to be safety conscious.

Perhaps it is possible to become too combat-oriented. Although the mission must be accomplished, flying aircraft recklessly is not the way to do it. It isn't good headwork to risk a Med-Evac crew of five men in an "attempt" to pick up a wounded man who is ". . . in no danger of death." Yet the Helicopter Aircraft Commander who disregards weather minimums and tries to sneak in under the weather is doing just that. He is risking all for very little. The attack pilot who lets down through an overcast between two mountain ridges just to prep a zone that may not have needed prepping is also guilty of being too combat-oriented.

All airplane drivers should bear in mind that, sacred as the mission is, we can reach a point where the probability of success diminishes. All the computers and safety programs in the world cannot select the point beyond which further exposure to dangers is "too much." But most experienced helicopter pilots (I'm speaking here of combat experience) seem to have a pretty well established guide as to what is "too much."

What we are talking about is judgment, a factor that is even more important in combat that at other times. It is the judgment factor that must be used to determine when the requirements for a mission violate a basic safety philosophy. A pilot facing enemy fire and still responsible for flying his airplane safely and efficiently doesn't need to buck the additional factor of bad weather. But we continue to lose aircraft and crews to crashes that result from inadvertent entries into IFR conditions. Second-guessing can and does provide some other answers, but regardless of what we call it, the pilot's judgment is the main factor. We must not become too combat-oriented. Accidents have destroyed more aircraft and pilots than enemy action through the years. Our young pilots have to be taught the value of good judgment in combat as well as in peacetime.

Good judgment will not only help keep an aviator out of troublesome situations but it will improve his chances if he does get in trouble. His difficulty may be mechanical failure, weather, or an enemy induced hazard. Flying in Southeast Asia a pilot regularly encounters monsoon rains, low visibility, rugged mountain ranges, and an enemy who strongly dislikes aircraft. But it is not enough for a pilot to be safety conscious about any two of these and not the others. Few aviators sell the enemy short, yet they will, with foolish abandon, push their mission through below-minimum weather. Why? Because their judgment is not really high level, it's only medium level. A pilot wouldn't think of taking a faulty aircraft and he will fly to ensure minimum exposure to enemy gunfire. But he will often let his weather judgment slip completely out of focus.

What we need is a re-evaluation of good judgment. A full realization that operational combat safety is more necessary than ever must be the first order of the day. Next, we should strive to create an environment that induces good judgment. We cannot alibi our weak decisions because we are in combat; rather, we should devise our safety programs to complement combat operations.

The end result will be high level judgment and substantial savings in lives and equipment. ◄

If you have a question concerning any phase of instrument flight for which you cannot find a satisfactory answer, send it to the Commanding Officer, VA-127, NAS Lemoore, Calif. 93245.

ON THE GLIDE SLOPE

Answers from Aggie

Dear Aggie:

We are wives of two young and dashing naval aviators and have an unusual problem. The other night at a small get-together we overheard our husbands, Freddie and Fritz, talking about the usual thing, flying. However, they got on a subject that we never heard about before—"Nodems." What we were concerned about was how our hubbies treated these nodems. They said they could be very important (the nodems, not Freddie and Fritz) but they admitted they never paid much attention to them and said they weren't worth much, after all.

Now we are confused. We love our husbands and want them to be safe on their cross-country trips (when we let them go); they owe it to us to be safe. We don't know what these nodems are, nor how important they really may be. That is why we would like you to print all the information on this subject you can. We tried asking F & F, but they always put us on when we get serious about their flying work. Can you help us?

Put On and Unhappy

Dear Put On and Unhappy:

Your husbands sound like a couple of duzies. If they overlook any part of flight planning, it should scare you (and them too), and if they skimp on notams (note the correct spelling) they may be headed for trouble. You see, they have a direct bearing on flight safety. Our Odd Facts Department has researched the subject and has lots of answers for you. Maybe your errant husbands will read this too, and see the errors of their ways.

No cross-country flight planning is safe or complete until a thorough check of current notams has been made. Notams is an acronym for "Notices to Airmen." An acronym is . . . . oh, well, it isn't important what an acronym is, but notams are. Notams in both the USAF/USN system and FAA systems should be checked to ensure that normal operations will prevail enroute and at the destination and alternate airports. The USAF/USN notam system covers three main categories of information; terminal navigation aids, air traffic control facilities and airport facilities. If F & F are lax on these items, they are flagrantly disregarding safety!

The notam system applies to USN, USMC, USAF, ANG, USCG and a few selected civilian facilities. The IFR Supplement is a ready reference for determining if a particular airfield is served by the notam system. A symbol will appear to the left of the airport name and it tells to what extent the field is covered by the notam system.

The overall system is managed by the USAF Central Notam Facility (CNF) located at Tinker

AFB. Military facilities in the system submit notams to the CNF as the need arises. The CNF, in turn, screens the incoming notam submissions and then prepares and re-transmits notam summaries on the USAF teletype net, got it? Isn't that neat?

Two different notam summaries are transmitted, and your pilot husbands should be familiar with both. Part I is transmitted twice a day and is the one that pilots are most familiar with. The notams cover (1) base facilities or (2) off shore areas, which deal, respectively, with (1) navigation aids, runway deficiencies, etc., and (2) warning area usage.

Part II of the notam summary is issued once a week. This summary is of particular interest to the pilot, although it is frequently overlooked. Part II contains notams of an indefinite duration (30 days or more) or notams involving specific corrections to the FLIPS.

The FAA operated civil notam system should be equally important to Freddie and Fritz. It reflects the status of FAA enroute navigation aids and terminal conditions at civil and military airfields. This coverage is available at military activities from the FAA service "A" (weather) teletype circuits; and features a daily summary of notams. These should be reviewed to ensure that all enroute navigation aids are functioning normally.

Notams are posted in the air station operations flight planning room. If your hubbies know the layout, they'll find it easier to locate all brands of notams. It looks like this:

NOTAM BOARD ARRANGEMENT

GENERAL NOTAMS PART 1B (WARNING AREAS) FAA NOTAMS (DAILY SUMMARY)	BASE NOTAMS PART 1A				NOTAM SUMMARY PART II (CHANGES TO FLIP AND NOTAMS LASTING MORE THAN 30 DAYS)
	A-H	I-N	O-R	S-Z	

The subject matter of notams must be limited to those conditions which would affect a pilot's decision to operate from an airfield or affect safety of flight enroute. The nature of proper notam information is generally known, but I'll list the specifics.

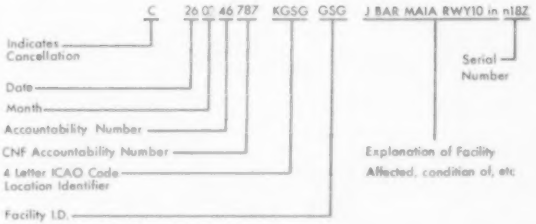
1. Withdrawal, breakdown, change of air navigation equipment such as radio, radar and lighting.
2. Field closed or partially closed, limiting aircraft operations.
3. Significant changes to current editions of FLIP.

Then again, certain kinds of facility information are restricted from the notam system.

1. VASI and mirror landing system
2. UHF/VHF, DF
3. Taxiing conditions (information can be obtained from terminal facility)
4. BOQ availability
5. Minor servicing limitations
6. Runway ice/snow/braking conditions and gale conditions are considered weather items and are appended to weather sequence reports.

Another point one must keep in mind is that navigation facilities are carried as "out" (even if operating) if unsatisfactory for IFR.

The basic notam is easily understood by pilots; however, it is preceded by seemingly undecipherable information. To fully appreciate the entire notam, please refer to this example:



If the date/month accountability group is preceded by an N, the notam is new. If preceded by an R, it is a revised notam.

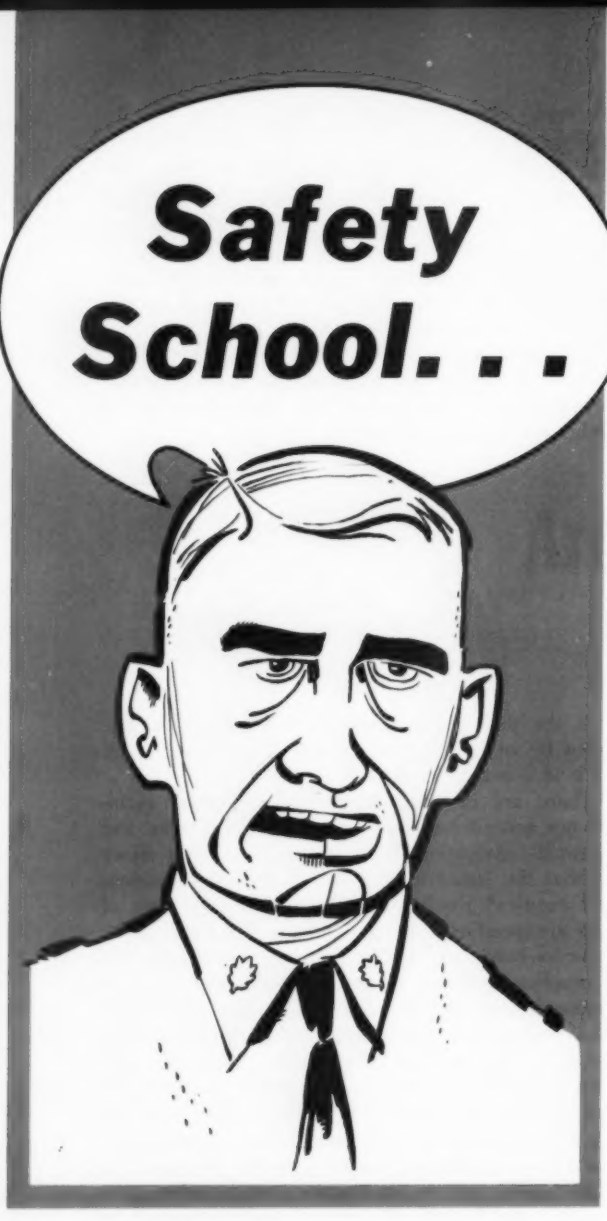
There are in effect *no notam* preventive maintenance procedures whereby USAF/USN radar and terminal navigation facilities may be shut down without the issuance of a notam. The time periods and required weather conditions for each type of gear are specified in the back of the IFR Supplement. Your husbands may find on this page the clue to why they cannot receive a particular nav aid on some weekend cross country (when you let them go). That's all girls. Let's hope that this clears up your questions on "nodems." Remember, there are FAA and USAF/USN systems. The FAA notams come out in daily summary form. The USAF/USN notams are issued daily and are in two categories, base notams and general (warning area) notams. The USAF/USN system also issues a weekly notam summary containing FLIP changes and notams of an indefinite nature. The more important terminal deficiencies are listed as notams; certain kinds of information are never listed. *No notam* preventive maintenance is very much with us.

Now have a long talk with your husbands and steer them in the right direction (towards the notam board). Let's hear from you again, and hang in there!

Best regards,

aggie

Safety School. . .



"The Ops Officer wants to see you," hit me just as I returned from a local training flight. I immediately changed out of my flight gear and went straight to his office wondering what I had done.

As I entered the office I felt uneasy as if some awaiting fate had finally caught up with me. The commander first explained that some new squadrons were being formed and that there was a need for qualified personnel to fill the billets in these outfits. He informed me that I was being transferred to one of the newly formed squadrons which in itself made me very happy. Then he dropped the bomb and I learned that I was to attend the ten-week Aviation Safety School at Monterey, California. I stammered my thanks as I left the office wondering, "Why me?"

I had heard from those before me that it wasn't exactly a snap course and, to top it off, aerodynamics never was my best subject. As I was driving home I was feverishly trying to figure out some way to tell the wife that she and I would be going to Monterey for 2½ months. I finally resolved the fact that it was best for me and that I would just blurt it out.

After I did, she leaped for joy. "I've always heard how beautiful Monterey is and this can be our second honeymoon," she said. I didn't have the heart to tell her that most of my time would be behind a desk trying to conquer the subjects that I had trouble with during flight school.

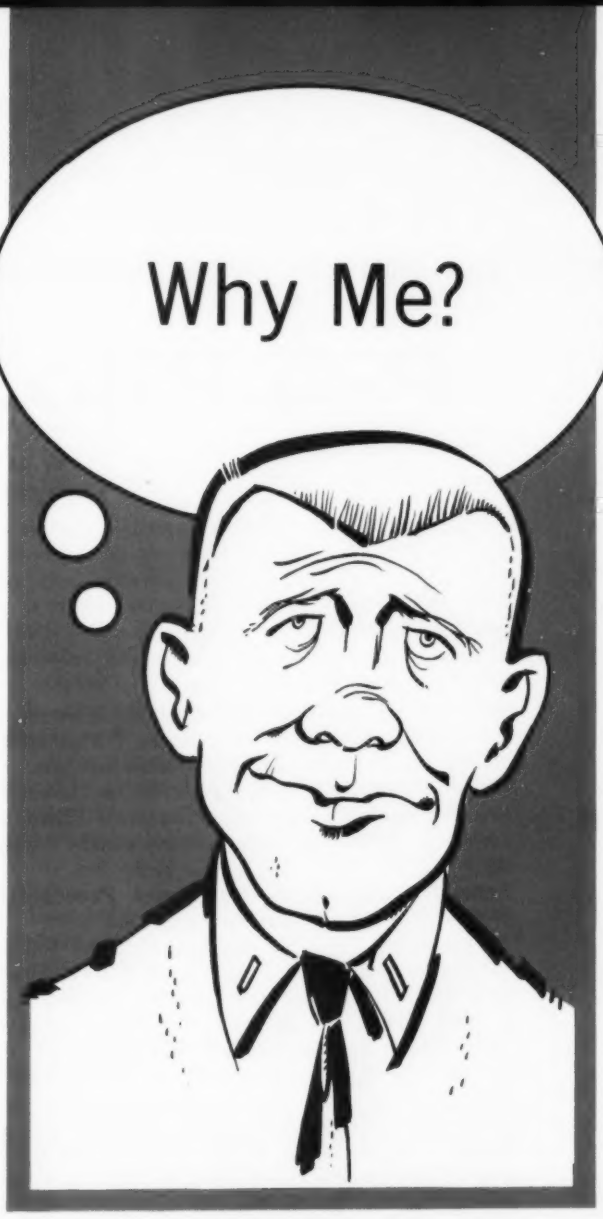
Checking into the Aviation Safety Officer School was not so bad except for one thing. It is held at the Naval Postgraduate School and during check-in I noticed many officers lugging masses of books and educational material around with them.

This wasn't as alarming as the worried looks on their faces. I finally completed check-in at the USNPGS and was informed that Safety School would be held at NAS Monterey. This was fine with me just as long as I could get away from the mad scramble that was taking place here.

As I walked into the academic building at NAS Monterey I felt much better. The buildings were old but painted very nicely and they presented a warm appearance. As I was about to leave after checking in, one of the professors remarked, "You had better be ready Monday morning." (This was Friday.) He made it sound about as inviting as jumping into a pit full of cobras. I rushed home and my wife informed me that we were going to meet some friends in San Francisco that weekend. I figured we might as well go as this would probably be my last free weekend for 2½ months.

Monday morning came around too early. I met my fellow classmates, many of whom I had known before. Then we were given our academic materials and finally began classes. Let me say at this point that the instructors at the Safety School are perhaps the most competent and interesting that I have ever known. First we met our engineering instructor.

Why Me?



By LTJG Stu Evans
ASO VAW-114

After a two hour lecture in basic math we were given an insurmountable amount of homework and were told to break for lunch. After lunch, we began Accident Investigation, Psychology and Physiology. The instructors were all professionals in their fields and were extremely interested in our progress. After getting our homework assignments, we all left the first day of school shaking our heads and saying that it couldn't be done.

I will not labor on about the courses that we covered day by day. I will say, however, that these courses covered more in a short time, than any others I had ever experienced before. The subjects included: Basic Algebra, Trigonometry, Aerodynamics, Metal Stress and Strain, Physics, Accident Prevention and Investigation, Psychology and Physiology. They were all thorough and provided each of us with the background to become a competent Aviation Safety Officer.

Well anyway, after ten weeks of sweat and extra study (known as stupid study) we all graduated. A few of the 25 officers in the class had "A" averages. But the majority, including myself, had a high "C" or low "B" for a final grade. Upon completion of this rugged course I did experience a feeling of accomplishment and pride. Not all pass the course, but the instructors are so interested in their students that very, very few ever flunk it. Only those who don't care and make no attempt to finish it will fail. After I received my diploma, I picked up my wife (she was eager to leave by now) and departed for my new squadron.

At this point I thought the hard part of being a Safety Officer was behind me! Well brother, let me clue you in right now! *The tough part is every day!* There are as many definitions of "safety" as there are C. O.s and Safety Officers. To achieve our mission as professional aviators with as much ease and minimum error as possible the word "safe" should be paramount. The tough part is to convince your contemporaries that safety is the "in" thing and not to shun it as they so often do. A really "safe" squadron is one that has just had an accident. Everyone is really safety conscious. But for how long? This varies with the safety officer. He must promote safety *daily* to maintain this safety conscious attitude.

As I look back at the Aviation Safety School I can visualize another group getting the same treatment that I once did. In conclusion I'll say this: I hope that someday everyone gets the opportunity to attend this school as it will make better aviators out of us all. Since this is not likely, it is up to each of us to act as safety officers since we are all professionals in naval aviation. This may not answer the question of "why me" when you are selected for Safety School, but it may help you understand the purpose of the school. After completing the course you will know "why me?" ◀

At one time or another most instructors have been guilty of overtraining their students in procedures that cover extremely rare actual emergencies.

P-3 Pilot Training

By Jay Beasley
Lockheed-California Co.

Considerable progress has been made in overcoming the subtitled problem in the P-3 program. For instance, boost-out landing practice has been reduced to the necessary minimum. It has, however, been revealed on occasion that dangerous situations are still being induced by instructors—usually during their first few months in the new bird.

Sensible Amounts of Emergency Procedures Practice Can Be Valuable

The average training emergency in the P-3 is very easily handled, since the aircraft has an abundance of power, is easily controlled, and has considerable system redundancy. The fact that the pilot under instruction can usually do a good job of handling the situation from the beginning may later lead him into a state of overconfidence. It may also influence the instructor to pile on more problems in order to get the student's attention. A situation of this sort can, and has, caused aircraft accidents.

Every Pilot Is Different

An instructor should certainly not be bound so tightly by the syllabus that he is restricted in imparting valuable techniques to stable, receptive students. Unfortunately, pilots vary in ability and temperament, which places greater unappreciated responsibilities on the instructor. Each pilot's potential must be fully developed, but always with due regard to safety. It must be considered that he will not only perform all of the maneuvers accomplished during training, but may add a few of his own after he is checked out in the squadron.

Use Horse Sense

Common sense and judgment must prevail at all times during training and squadron operations. How far to go in training is always questionable, as it is obvious that *all* potential emergencies cannot be practiced. There are aviators with 15 years experience who have never lost an engine in flight, while others have had more than their share. Lack of training has no doubt caused aircraft damage, whereas overtraining has also been costly. In almost every case, though, sound judgment would have reduced the hazards.

A good example in training was the hot and cold attitude toward single-engine-reverse practice in the P-2 *Neptune*. In the past, some commanding officers refused to allow this practice in the squadron but sanctioned its use under actual conditions "if needed." Without previous practice this "last resort" could produce *striking* results, pun intended.

NATOPS Is In The Act

NATOPS is the development, by many very competent pilots and associated people, of the best known ways to handle a particular aircraft under normal and emergency conditions. It is inevitable that some people will be dissatisfied with the procedures, since they had no part in their creation. Some feel that they are hamstrung with trivial numbers and words. Others feel content to regard NATOPS as a book of law to be used, if necessary, in defense of their own poor judgment. The NATOPS officers, evaluators, and model managers are always in search of im-

proved procedures and welcome suggestions by all crew members.

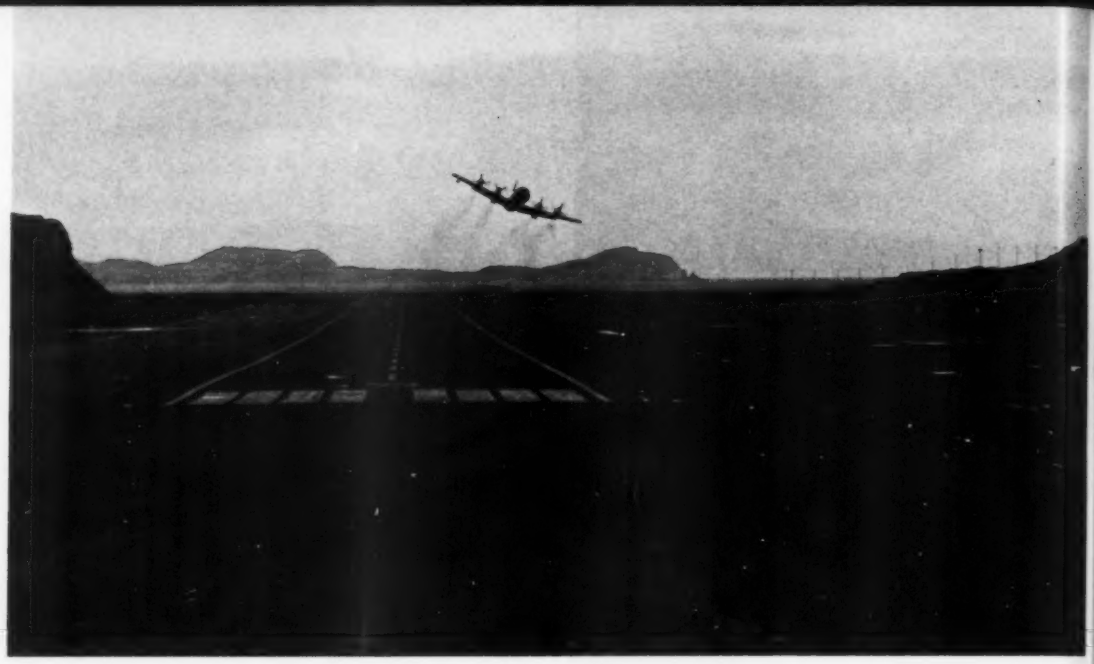
Today's state-of-the-art toward standardization is a far cry from only a few years ago when each VP squadron had its own SOP. It was frightening to observe conflicting procedures at each base, and sometimes in the same hangar, in the operation of identical aircraft.

It is the obligation of all pilots to interpret NATOPS as it is designed. "It provides the best available operating instructions for most circumstances, but no manual is a substitute for sound judgment. Multiple emergencies, adverse weather, or terrain may require modification of the procedures herein."

Certain remote potential emergency procedures should be practiced if they are intended to be used in squadron operation. Judgment must be exercised in determining which to practice and how often. Generally, one or two satisfactory demonstrations are sufficient.

Among the maneuvers which are *possibly practiced too often* are two-engine-out, no-flap, and ultra-short-field landings. The P-3 NATOPS manual forbids multiple emergencies in the pattern and emergencies of any nature at night. Such ridiculous things as shutting off all boost pumps just after takeoff, pulling on power lever cables, and *practicing* boost

P-3 operations. Above: low-level ASW ops; left: in formation



Takeoff at Adak

out stalls should never be done. Taxiing down an 11,000′ runway to within 300′ of the end, then practicing short field takeoffs might be hard to explain to the accident board.

Windmill Starts

On occasion engine starters have failed at a base without spare parts. The situation may be demanding enough to continue the trip without a lengthy delay. The decision to windmill start the engine or make a three-engine takeoff with subsequent airstart will depend on several factors. First of all, an inspection should be conducted to determine that the starter cannot be engaged to the engine by *troubleshooting* the associated systems. Inoperative engine position (i.e. No. 1 or No. 4) and pilot experience, as well as gross weight and runway length, are only some of the other considerations. The recommended maximum weight for a three-engine takeoff is 100,000 lbs under ideal conditions.

Neither procedure is difficult provided proper techniques are used. However, on numerous occasions tires have been blown resulting from brake application for directional control. Probably in every case the pilot had not been trained for the maneuver.

During a windmill start the pilot has but one responsibility—to accelerate to a maximum of 90 kts and stop on the runway, whether or not the engine starts. On a three-engine takeoff he must become airborne and clear existing obstacles before performing an airstart. Engine failure during this period would create the situation that a single-engine pilot faces on every takeoff. Since the acceleration and stopping distances will generally be less than that required for a three-engine takeoff, it would seem more practical to start the engine on the ground.

The NATOPS windmill start procedure is very complete and concise, but a few helpful hints may be in order. Each crew member must clearly understand his duties and functions, which can only be accomplished by reading the procedures and streamlining them into a concise briefing. The pilot in command must not concern himself with anything but directional control and stopping the aircraft. Instrument scan at this time could allow a swerve to progress requiring immediate action. Oddly enough, the natural reaction is to stomp on the brakes rather than decrease asymmetric power when rudder and aileron are no longer adequate.

In summary, the pilot must keep his eyes on the runway, the flight engineer unfeathers and monitors the start, and the copilot is the program director. He also has the responsibility of assisting the pilot with the ailerons. Aileron positioning is very important during acceleration, particularly if No. 1 engine is inoperative. When the abort is commenced, and as power is being developed on No. 1, the aileron should be applied in the opposite direction upon command of the pilot.

Remember that it is no disgrace to abort the takeoff roll should a rapid swerve occur. Taxi back and try it again. It would be embarrassing to blow a main mount or grind the nose tires to shreds.

An *Orion* surveys the Arctic waste

Flight-Idle Approach from 1000′

This maneuver could possibly be the most hazardous of all training maneuvers, and its value is questionable. The only practical value of the maneuver would be practice for an approach over extremely high terrain to a short runway. Conditions of this nature exist at only a few remote airports and then only on certain runways.

Several airplanes, including a four-engine prop jet transport, have been demolished during training because the pilots inexpertly performed this maneuver. Proper airspeed must be maintained all the way down to the beginning of the roundout to flare. Too slow an approach can, of course, result in rapid decay of airspeed during the flare resulting in an unexpected high sink rate even though the aircraft is rotated nose high. Due to the hazards involved and questionable practical use of the technique, it may be well to consider its removal from the training syllabus.

Many instructors no longer require students to perform this item but prefer to demonstrate one per customer. This may backfire, as the student is most likely to perform for the crew soon after being designated as a plane commander.

Over Pax River

P-3 on shipping patrol

Perhaps a more realistic training maneuver would be to simulate a normal glide slope approach, "breaking-out" and going contact at 100-150′ with 140 kts or greater close in to the threshold of an imaginary short runway. At this point the power could be reduced to flight idle and a safe landing executed. This may impress the student that a smooth landing can be made near the normal touchdown point when excessive airspeed prevails on short final.

Floating halfway down the runway with excessive power is poor practice under any condition. This habit-forming ultra-smooth landing technique has created the need for full reverse and maximum braking at places like Norfolk and Burbank. Add a tail wind and possible hydroplaning and the rollout could be extremely marginal.

Fly the airplane and make it work for you to fit all varying conditions.

The loss of two engines on one side of a four-engine airplane has been a rare, actual occurrence. However, since the possibility exists, the procedure

of approach and landing should be performed during pilot checkout.

The need for repeated two-engine landing practice is usually exaggerated during training creating unnecessary hazards and robbing the transitioning pilot of flight time needed to improve normal techniques. Once the student has satisfactorily demonstrated this procedure, repetition should be discontinued. A concise briefing and practice at altitude can, no doubt, save valuable flight time and possible hazards in the traffic pattern. This is particularly true for two-engine waveoffs.

Power settings are the determining factor for a good approach to a landing. Regardless of the number of engines being used, a normal approach can be made providing the total SHP is that required. For instance, at normal pattern weights, approximately 1000 shp for each of the four engines (i.e. 4000 shp) is required for downwind, tapering to a nominal value at touchdown. Using two symmetrical engines, the downwind leg should require each to be set at approximately 2000 shp. Using two engines on one side, the SHP required should be about 2200 each to counteract the yaw factor. At the 90-degree position about 700 shp is required on each of the four engines. For two symmetrical engines the requirement would be about 1400 shp and for two on one side about 1500 each. In all cases, the total SHP required on short final should total approximately 2000.

Since power settings are all important in performing this maneuver, the first landing should be made using symmetrical engines. This will allow the student to concentrate on power settings and a normal pattern without the worry of directional control and rudder trim adjustments. The common tendency is to pull off too much power at the 180 and have to add it again on short final. Adding power on symmetrical engines does not present a problem, whereas the opposite is true using two on one side. Many approaches are ruined because of poor planning in power handling. Some of these approaches are aborted to a two-engine waveoff upon command of the instructor.

Two-engine waveoffs are not difficult at training weights providing the proper technique is used. The following is a description of what can happen when poor technique is used with engines 3 and 4 operating.

Waveoff Practice

The decision is made on short final to waveoff. The student calls for maximum power on 3 and 4 and the flight engineer rapidly advances the power. Due to the rolling tendency the left wing gets down about 10 degrees. The aircraft is now in a forward slip, a maneuver used to lose altitude without gaining airspeed! Since the situation is rapidly becoming intolerable, the instructor advances the power on engines 1 and 2 and a violent right yaw occurs. The student has been pushing right rudder with all his strength aided by right rudder tab. He suddenly gets a terrific assist from power application on the port engines and may not react quickly enough. Instructors must be prepared to anticipate the student's reactions and to allow for a margin of safety at all times.

It is imperative in the above situation to anticipate the rolling tendency and maintain 5 degrees right wing down. The student should make the initial power application then call for maximum power when directional control is being maintained. During climbout with 5 degrees of right wing down the ball will be slightly to the right. If enough rudder is applied to center the ball with the wing down, the aircraft will turn to the right.

Under actual conditions, assuming both port engines are secured, the following helpful hints may be in order.

Conduct a cockpit meeting to size up the situation. Conclude that all systems are *Go* except for power on the port side. Agreed that when reverse is selected the aircraft should yaw to the right. Anticipate the use of left rudder and aileron to counteract the yaw. Nose wheel steering can be used as necessary. Remember that the aircraft will be clean with two propellers feathered and will float considerably if the approach is too fast.

Obtain priority (*Declare an emergency—Ed.*) from the tower and enter a normal traffic pattern. A normal pattern is not only geographic but also normal in configuration and power settings. Remember that about 2200 shp per engine is required downwind at 150-160 kts with approach flaps at pattern weights. If the aircraft is maintaining altitude with this power and speed, the pattern is normal and the gear may be extended at the 180 for a perfectly normal approach. Obviously, if 3000 shp is required to maintain altitude the aircraft is "behind the curve" and gear extension should be delayed until the speed/power relationship is normal. Avoid high approaches with high sink rates.

Follow NATOPS procedures and don't clutch.

DEAD RECKONING

"While watching television around 1400 we heard a loud explosion, and the trailer we live in shook slightly. We thought it might be an aircraft breaking the sound barrier. At this time it was raining very hard and the hills were shrouded in clouds. The hills were not visible from the valley floor." This is what one witness stated after two A-4s, on a sandblower flight, struck the side of a hill near his trailer. (Note picture.)

Earlier that day the pilots had prepared for this flight, a scheduled NATOPS check and sandblower flight. At 1300 local an NAS weather advisory noted that conditions to the north of NAS were deteriorating and any planned VFR flight should be flown south of this station. At 1344 the two A-4s were airborne on a VFR local flight plan, and at 1354 they flew into a hillside 63 miles to the north of NAS. Estimated weather at the crash site was 600′ broken, 1200′ overcast, visibility one mile, light rain and fog. The report reads, "The most probable cause of this accident is pilot factor in that the flight leader attempted to maintain VFR while descending in IFR weather conditions." It sounds all too familiar, yet two well qualified naval aviators lost their lives for just this reason. If common sense doesn't tell you to remain VFR while conducting Sandblower flights, then DOD *Flight Information Publication (Planning)*, Section 11A, will. On page B8 of Section III, concerning Low Altitude High Speed Routes, it notes, "Flights will be conducted along established routes only when the forecasted and encountered weather conditions are equal to or better than a ceiling of 3000′ and a visibility of five miles." You, too, could be dead, reckoning you can remain VFR while flying low level under actual instrument conditions. (Note picture.)

The valley that wasn't there.
Rain and fog shrouded these hills.

An introduction *in depth* to a new reporting system which promises increased benefits to all levels of naval aviation.

IFARS

Individual Flight Activity Reporting System

In September 1965, CNO directed the Commander Naval Aviation Safety Center (now the Naval Safety Center) to develop a system to collect, process and bank individual flying data. IFARS, which went into effect 1 July 1968, is the computerized result. The June 1968 issue of APPROACH carried a short article on this subject.

IFARS Is More Than IFTR Replacement

IFARS will do away with the need for each individual flyer to complete the Annual Individual Flight Time Report. And, although many readers may not be aware of it, this is but one of the many things IFARS promises. IFARS is in fact, a comprehensive high-resolution data collection system which will not only provide answers to many nagging questions which are beyond the scope of the present low-resolution IFTR data, but will also serve to eliminate a number of other existing records and reports.

The reporting system will apply to all Navy and Marine aviators and flight officers, naval aviation pilots and flight surgeons on active duty in a DIFOT status and to those participating in the Navy and Marine Air Reserve programs in one of these categories.

To insure an orderly, comprehensive development and implementation, IFARS is evolving in phases.

Phase I—Laying the Groundwork

In developing the system, the Naval Safety Center established and adhered to these guidelines:

- Develop a single integrated reporting system broader in scope, more detailed, more timely, and more responsive to management need.
- Retain the elements of information now required by OpNav, NavPers, and CMC from the present IFTR system.
- Remain within the perimeter of the standard 80-column data card.
- Obtain basic source information from part D of the present *yellow sheet*.

Studies were initiated to determine requirements for data elements, data collection and management, and data processing equipment. These studies resulted in:

- Establishing availability of a Honeywell 1200 computer, installed at the NavSafeCen, to process IFARS data.
- Development and issue of necessary forms and instructions to aircraft reporting custodians and data processing support centers.

With this groundwork completed, Phase I has been concluded.

Phase II—IFARS in Operation

Phase II commenced 1 July 1968. At that time aircraft reporting custodians should have had the necessary directives and forms in hand to implement the system. Operation of the system as outlined below is now in progress.

3M system elements utilized. The IFARS has been designed around existing documentation using procedures similar to the 3M system. It was done in this way so that conversion to IFARS would be as easy as possible using existing source documents, procedures and terminology. It is to be emphasized, however, that this is the extent of its present connection with the 3M system. Data collection and reporting for IFARS will be accomplished by the same personnel who have been responsible in the past for maintenance of IFTR data, i.e., individual flyers and flight/log records section personnel.

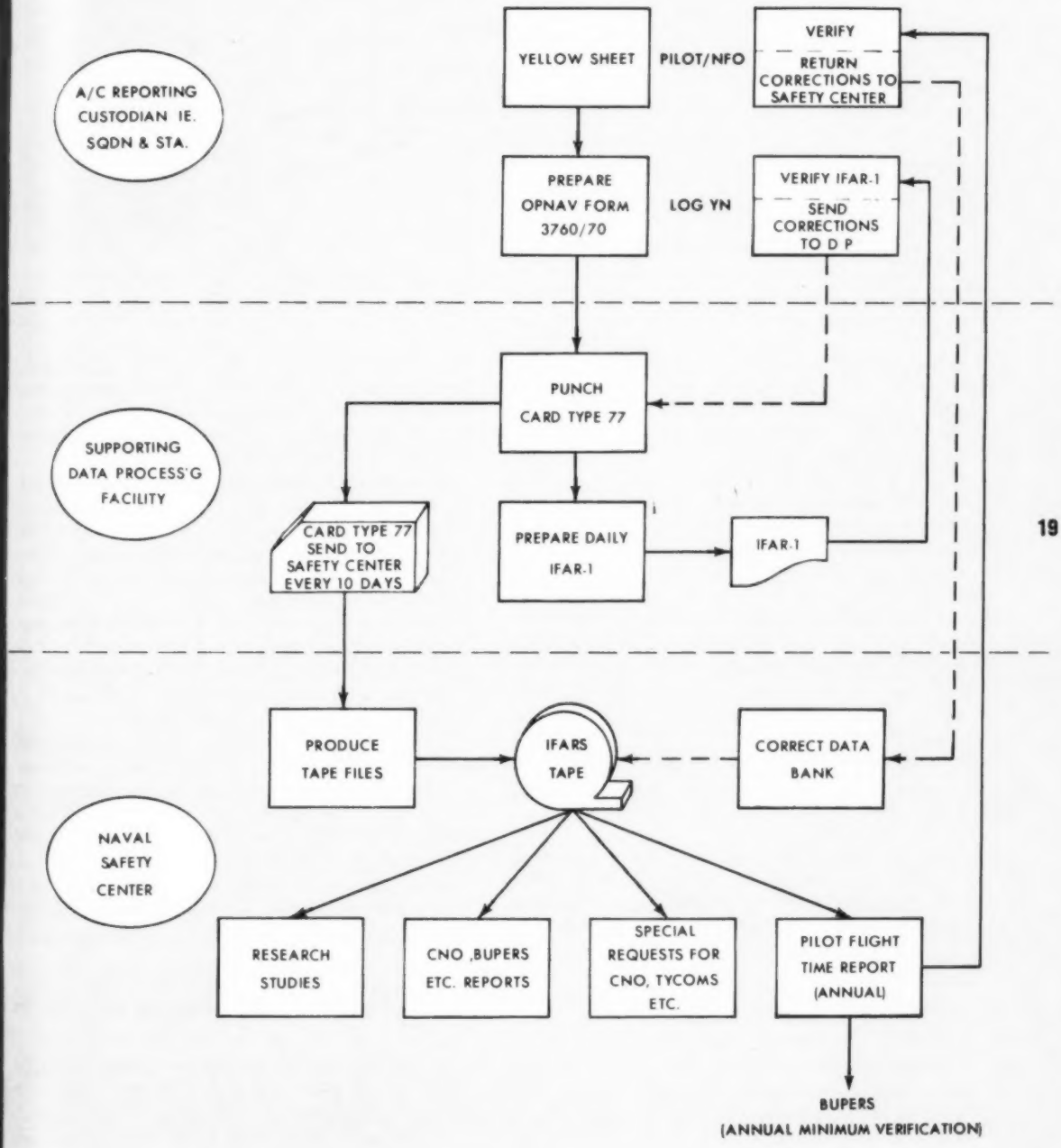
The *yellow sheet* remains the primary source document for IFARS reporting. For the present the pilot will continue to fill out the *yellow sheet* as he has done in the past, but with modifications, e.g., it is essential that service numbers and branch of service (USN, USNR, USMC, USMCR, or other) be included under the individual's name on part D. In addition, NFOs will be included on the front of the *yellow sheet*. Names are not punched on the EAM Card (Type 77) and service numbers are therefore the only means of identification.

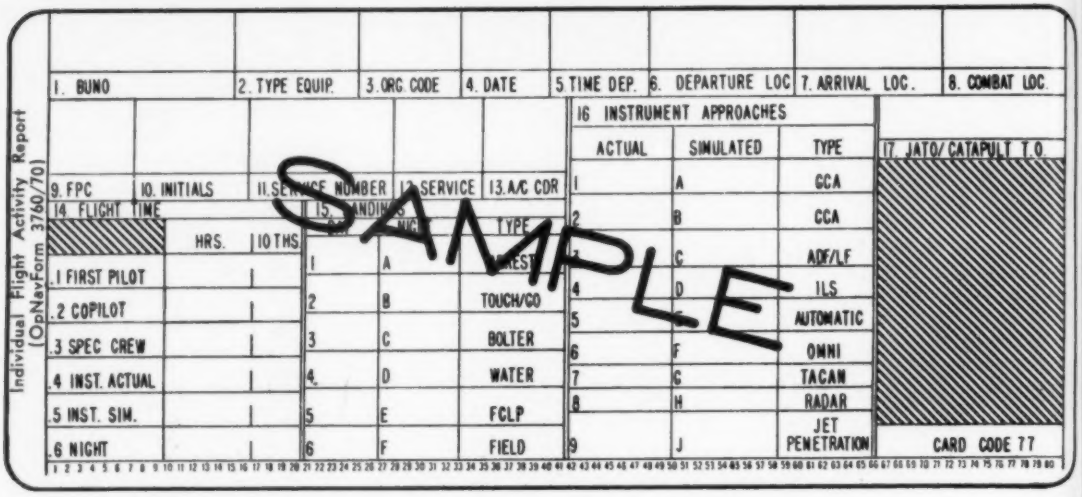
Note: While names are not punched on the EAM card or entered on OpNavForm 3760/70—the *first and last initials* of the individual are entered on both. Examples of first and last initials:

"J. S."—for *J*oseph P. *S*mith.

"W. S."—for *W*illiam (NMN) *S*mith, Jr.

IFARS DATA FLOW





Data flow and processing. The data on part D of the *yellow sheet* is transcribed on the Individual Flight Activity Report (OpNav Form 3760/70) or other suitable transmittal documents by flight/logs records personnel. It is delivered to the local data processing facility for punching and forwarding to the NavSafeCen. A separate card is filled out for each individual listed on the front of the *yellow sheet*. This card is designed to be as simple as possible considering the requirement to include a large amount of data on one 80-column card. Codes currently in use in the 3M system and familiar to squadron personnel have been used where appropriate to facilitate completion and increased accuracy. Examples of this are the use of 3M equipment codes for model identification, use of 3M organization codes for the reporting custodian and use of the 3M CT 76 method for coding landings (which has also been extended to coding of instrument approaches). Data elements of this report are therefore not completely new to squadron personnel.

Data processing and verification procedures closely parallel those being used by the 3M system. The cards submitted each day to data processing are punched and a daily machine listing (IFAR-1 report) supplied to the aircraft reporting custodian, in most cases.

The IFAR-1 report is checked by the reporting custodian for accuracy, annotated as to errors and returned to the data processing support center for correction. The verified cards are collected and submitted by the data processing support center to the NavSafeCen at intervals: on the 10th, 20th and last day of each month. In addition, each reporting custodian is required to submit a monthly report to the Center giving the total number of line entries from the daily IFAR-1 report for that month. This is used as a control to verify that all cards submitted by each unit have been received at the Center.

Annually, the Center will provide a computer listing to each individual pilot, containing a summary of his flight time for the year. This will replace the existing IFTR which was eliminated after submission of the FY 68 report. It is worth noting that IFTR is the only report which has been eliminated by IFARS as of this writing. It is also anticipated that more frequent feedback reports will be provided to a sample of pilots to serve as a check on the operation of the system during its first year of operation.

Phase III—The Payoff

Phase III is the payoff, or attainment of IFARS objectives. It should be understood that development of Phase III objectives is now taking place concurrently with Phase II and the next year will see a number of modifications to the system. Specific objectives targeted for 1 July 1969 are:

- A standardized computer listing designed to replace the master flight log.
- A standardized computer listing designed to replace the individual flight log book.
- Elimination of other reports and their replacement by computer-prepared reports from IFARS data.
- Updating and maintenance of a high-resolution data bank which can be used to support valid management decisions in a wide area of operations.

Development work in progress during the next

year will include a redesign of part D of the *yellow sheet* as a two-copy card type form (a flimsy and a hard copy). The flimsy will remain with the aircraft reporting custodian (operations) and the hard copy will be forwarded to the data processing support facility for punching of an EAM card and daily printout. This will eliminate the need for OpNav Form 3760/70, which is now specified for use in the system.

What Is IFARS' Potential?

The full potential of the IFARS is not completely defined. It will grow and develop and as it does many new benefits are expected to become evident. As a beginning, it is visualized that proper use of the IFARS data bank will provide management with the capability to answer questions such as these:

- What is the relationship between the "tempo of ops" and the aircraft accident rate?
- What is the carqual landing accident rate by ship, by naval aircraft?
- What effect does the output quota levied upon the Training Command have on the accident rate in later years?
- Are some individual pilots accident-prone or do they just do more hazardous kinds of flying?
- Do the hazards associated with simulated approaches, autorotations and low altitude emergencies compare favorably with the proficiency gained?
- What is the relationship between the aircraft accident rate and:
  (1) Length of in-port periods?
  (2) Length of cruise (deployment)?
  (3) Presence or absence, and extent, of refresher carqual following inport periods?
  (4) Frequency of transition flying by model aircraft?
  (5) The total number of aircraft (especially high performance) that a pilot is qualified to fly?
- What is the difference in the accident rates (day and night) among fleets, cardivs, etc.?
- What is the effect upon accident rates in reducing the number of flight hours per pilot per month in the Reserve Training Command?

Summing up, IFARS can be expected to make a substantial contribution to naval aviation in the near future by automating many tedious record-keeping functions and by providing data necessary for improved safety and combat readiness. ◄

IFARS Directives

OpNavInst 3760.10—IFARS Submission Procedures
OpNavInst 3760.11—IFARS Data Processing Instructions
OpNavInst 3710.7D—General NATOPS.

IFAR-1 AS OF 8095

AIRCRAFT BUREAU NUMBER	TYPE EQUIPMENT	REPORTING CUSTODIAN	DATE	TIME DEPARTED	DEPARTURE LOC.	ARRIVAL LOC.	COMBAT LOCATION	FLIGHT PURPOSE CODE	INITIALS	SERVICE NUMBER	SERVICE	A/C COMMANDER	FIRST PILOT TIME	CO-PILOT TIME	SPECIAL CREW TIME	INSTRUMENT TIME (ACTUAL)	INSTRUMENT TIME (SIM.)	NIGHT TIME	LANDING TYPE	LANDING NUMBER	LANDING TYPE	LANDING NUMBER	LANDING TYPE	LANDING NUMBER	APPROACH TYPE	APPROACH NUMBER	APPROACH TYPE	APPROACH NUMBER	APPROACH TYPE	APPROACH NUMBER	JATO/CAT. T.O.
BUNO	TE	ORG	DAT	TD	DL	AL	C	FPC	I	SN	S	C	FPT	CPT	SCT	ITA	ITS	NT	T	N	T	N	T	N	T	N	T	N	T	N	A
145962	APAE	AU5	092	05	NIP	NIP		1B2	EW	0567186	1	A	05.2			01.5			6	4					A	3	D	2			
145962	APAE	AU5	092	05	NIP	NIP		1		0542144	1			05.2																	
131249	APAE	AU5	092	08	NIP	NIP		1E8	FH	0579422	2	A	04.6	02.4					6	1											
131249	APAE	AU5	092	08	NIP	NIP		1F8	AR	0544926			02.4	04.0																	
131249	APAE	AU5	092	08	NIP	NIP		1F8	CW	0685695	2																				
131249	APAE	AU5	092	08	NIP	NIP		1F8	SH	0682341	2				07.0																
146678	APAE	AU5	092	11	NIP	NIP		1F1	JK	0534827	1	A	01.9	02.5			00.8		6	3					C	2					
146678	APAE	AU5	092	11	NIP	NIP		1E1	MJ	0546786	1		02.5	01.9			01.2		6	9					G	5					
135568	APAE	AU5	093	16	NIP	NIP		3F1	JD	0538541	1	A		06.5				06.0													
135568	APAE	AU5	093	16	NIP	NIP		3E1	BR	0546783	1		04.5		02.0		01.5	04.5	F	4					A	6					
135568	APAE	AU5	093	16	NIP	NIP		3E1	EC	0593514	1		02.0		04.5			01.5	F	6											

SAMPLE

Daily Individual Flight Activity Report Data (IFAR-1)

The Importance of Briefings

The winter weather was not very promising for an introduction hop of two TF-9Js to night formation. The flight was briefed with the weather at 3000′ broken, 9000′ overcast, seven miles visibility and expected to change with the approaching front. Techniques of rendezvous, formation procedures, and aircraft light signals were a few of the topics discussed.

Weather was checked and cloud layers were forecast to be lowering. Regardless it was decided that the hop would go and be terminated with a tacan penetration and GCA pickup if the need arose. The two *Cougars* were manned with the wingman starting first. He experienced no delays. Lead aircraft, however, had trouble with his lights. It was not until about 20 minutes later that the flight started to taxi.

Takeoff was uneventful with a 20-second interval between aircraft. No. 2 pilot experienced vertigo on climbout and quickly initiated recovery from a 30-degree nose-down, 60-degree angle-of-bank position.

Positive visual contact was established with lead aircraft and check-in was initiated. The climbing rendezvous, VFR on-top, was without incident. After two break-ups and rendezvous, base radioed that the weather was 600′ broken, 1000′ broken, 3200′ overcast with six miles visibility in ground fog. The field was IFR. This message was passed on to the lead aircraft by No. 2 because base had had trouble establishing communications with the lead. After this transmission No. 2 aircraft lost its transmitter but maintained receiving capability. Rendezvous was discontinued and the wingman established himself in a port cruise position. Radios were checked and frequencies changed, all to no avail. Lead told No. 2, on Guard, to switch to approach control. Having done so, No. 2 tried to communicate, but failed.

At this time the flight was in holding over the initial approach fix. The wingman heard approach control trying to contact the lead, requesting him to repeat a previous transmission. After a few minutes, approach asked another question. Communications were again attempted between the two aircraft by No. 2 as he switched the ARR-40 to command position on the prebriefed channel 3 and turned the volume up. Lead dialed in this frequency on his ARC-27, which was operating sporadically, but this failed to produce results.

A clean penetration in section was commenced during which lead's RMI began to act up. The

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

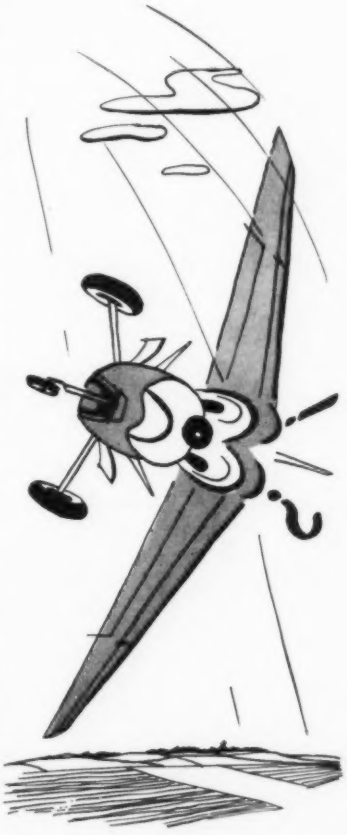
weather, by this time, had lowered to 400′ broken, 1000′ overcast with six miles visibility in ground fog. With the help of radar vectors, the flight penetrated to about 1500′. As No. 2 switched to the starboard side his low fuel light came ON and both aircraft slowed down and leveled off. No. 2 noticed lead's gear dropping by its white belly light. Two followed suit with the flaps, but was slightly late and began to under-run. Upon recovering, the two aircraft were in a cloud layer. Visual contact was lost. Lead was last seen in a slightly descending port turn, so No. 2 went on the gages, leveled his wings, and slowly climbed to get VFR above the overcast. As the wingman regained altitude, he noticed the runway lights passing parallel to his flight path on the port side.

Lead had pulled up when he saw the wingman drop down. He cleaned up and climbed above the overcast, where he was radar-vectored to a wide downwind pattern. It was necessary for him to change frequencies four times to maintain contact with station radar. No. 2 plane spotted an aircraft in the distance at his nine o'clock position. Assuming that the lead had landed and that this aircraft was on a GCA, he raised the gear, flaps and commenced to rendezvous. Radar told the lead that they spotted someone in trail. Lead then requested another no-gyro approach.

No. 2, finding the other aircraft at about 225 kts and heading away from the field, decided that for the fuel left (800 lbs), he would intercept the runway heading on tacan about 5-6 miles and descend. He overshot the runway and No. 2 again saw the runway lights pass on the port side. He stopped the descent, waited until he passed the end of the runway, climbed to VFR on top, turned to the reciprocal heading downwind, and timed flight for two minutes. Fuel was registered as 600 lbs.

At the end of the two minutes time he made the turn to final and initiated a very carefully monitored descent. Visual contact was made with the field at about 300′, and at the 90-degree position. The landing was without further incident. Lead was notified that a "no-radio aircraft" had landed, and soon afterward lead landed on another no-gyro approach. At shutdown No. 2 had 500 lbs of fuel left.

It is evident from this episode that in the brief not only a thorough understanding of what to do in a no-radio situation should be established, but also that the signals to be used for speed brakes, gear, flaps, etc. at night should be understood and used by all concerned.—Ed.



Hot Pilot on the Break

The F-8 responded normally after takeoff and during the practice air intercept mission. Returning to home plate, I broke over the numbers at over 400 knots. I pulled 6G to slow down, but my 180 position was a little wider and faster than normal. While still in a turn of about 15 degrees left wing down, I lowered the gear and raised the wing abruptly, the aircraft snapped farther over to the left and full right stick and rudder were required to stop the impending aileron roll. My first reaction was to eject, but with 1000′ of altitude still remaining I added full power to stop the rate of descent and lowered the wing. This procedure corrected the problem and I made an *uneventful* wing-down landing on the next pass.

It was later determined by a tech rep that a split aileron condition had been caused by a funk spring improperly installed on the port aileron pack. The break had been violent enough to dislodge the spring preventing the port aileron from lowering when the wing was raised.

My regard for NATOPS procedures has been increased considerably since this flight. By not raising the wing while straight and level, I had almost been forced to eject in the landing pattern while inverted. I intend to cool it from now on.

This is a good example to justify explicit adherence to landing patterns and procedure as delineated in NATOPS.—Ed. ◀

Albert's Ripcord

'Ast 'eard tale of Albert Ramsbottom
An' 'is tussle wi' Peter at Gate,
When 'e found 'imself stranded in 'eaven
'Cos 'e thought of 'is ripcord too late?

"Look 'ere, Sir," says Albert determined,
As position got 'orribly clear,
"Got missus and kids down in Yorkshire—
'Ow'll they get on there if I'm 'ere?

Saint Peter scratched whiskers, then answered:
"Ye're lucky to be 'ere—don't carp!
'Twere better to stay while ye're welcome,
And be issued wi' white robe an' 'arp."

Then Albert got 'ot under collar—
'E were thinking o' Mabel in plight,
An' green peas comin' in on allotment,
An' "The Bull" of a Saturday night.

"We was up," 'e explained, "over Prangmere,
I were peaceful-like, thinking o' nowt,
When all at once flames shot from rudder,
An' pilot gave word to bale out."

"The suddeness gave me a shock like—
It weren't quite like jumpin' off bus—
Ye see, what 'ad appeared to others,
I thought, couldn't 'appen to us"

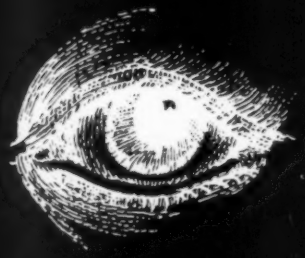
"I were dazed still when 'atch were
shoved open,
A voice said 'Unconscious, don't wait!'
An' it weren't 'till ground rushed up to
meet me
That I thought of my ripcord, too late."

"After all yer instructions"—bawls Peter,
The 'undreds o' times ye've been told,
No more Yorkshire puddin' for you, son—
Ye've had it—get into yon fold!"

Take warning from Albert Ramsbottom,
And take always a very poor view
Of the saying "It may never 'appen"—
It ma 'appen, presto! to you.

—*Royal Navy Cockpit*
No. 40

to



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Some people see a lot better in the dark than others. In fact, those of us with the best night vision can see 10 times better at night than those of us with the poorest night vision. With training and practice and some understanding of the basics, however, most people can double their night vision efficiency.

Any discussion of night vision must begin with the rods and cones. At the back of the eye, we have a photosensitive layer called the retina. This is where the optic nerve connecting with the brain terminates in tiny light-sensitive structures called, because of their shapes "rods" and "cones."

In simplified terms, here is how it all works: each individual rod or cone registers an amount of light by means of chemicals which trigger impulses transmitted by the optic nerve to the brain. The brain then puts together an image from thousands of rod and cone reports and we "see."

Cones register movement, detail and color. Rods detect movement, pick up shapes in shades of gray and black and register the *light* of all colors except deep red. You can test the rods' inability to register color by placing a small brightly-colored object where you can just see it out of the corner of your eyes. You will find you can make out its shape but you can't be positive of its color unless you turn your head and bring your cone vision to bear on it.

Cones cannot register any light dimmer than moonlight; rods are sensitive to light 1/100 as bright as starlight. At night you can see runway markers and signal flares in color because their brightness or intensity is above the vision threshold of your cones.

Distribution

Distribution of rods and cones in the retina accounts for a number of facts of vision. The center of the retina is densely packed with cones but there are no rods in this area. Toward the periphery of the retina cones become less numerous and gradually are replaced by rods entirely. This distribution explains our ability to see color and detail in the daytime when the cones in our central vision can function. It also explains our inability to see an object if we look directly at it at night when the cones are inoperative. (No rods in the center, remember?) At night in order to see an object we must look to one side of it for it to register. This is known as "off-center vision."

Rods register objects at night by contrast, that is whether they are lighter or darker than their surroundings. For this reason at night other aircraft can be seen better if they are above you and silhouetted against the sky. Aircraft flying below over dark land are less visible. Planes passing over white clouds below are more visible.

Rod Sensitivity Fluctuates

The sensitivity of rods fluctuates. During prolonged visual search at night rods can become temporarily fatigued for a few seconds to a minute or more. The result—the object you are looking at "disappears" momentarily until the rods regain their sensitivity and you see again.

There are no rods or cones in the area directly over the optic disc where the optic nerve fibers and central retinal blood vessels pass into the eyeball. This creates a blind spot in the field of vision of

VISION

BLIND SPOT SELF-TEST

Cover your right eye and focus your left eye on the cross. Move the diagram toward you until the dot disappears. To try this on your right eye, turn the diagram upside down.

Fig. 1

each eye (see Fig. 1). This, plus the fact that the eye does not "see" well during movement of an image across the retina, makes systematic scanning necessary. Max effectiveness in scanning is achieved by a series of short regularly-spaced eye movements (Fig. 2). Because of the absence of central vision at night, the scanner has to resist the impulse to look directly at an object located by his scan. He must, instead, use his off-center vision. This may require some practice.

Scanning Technique

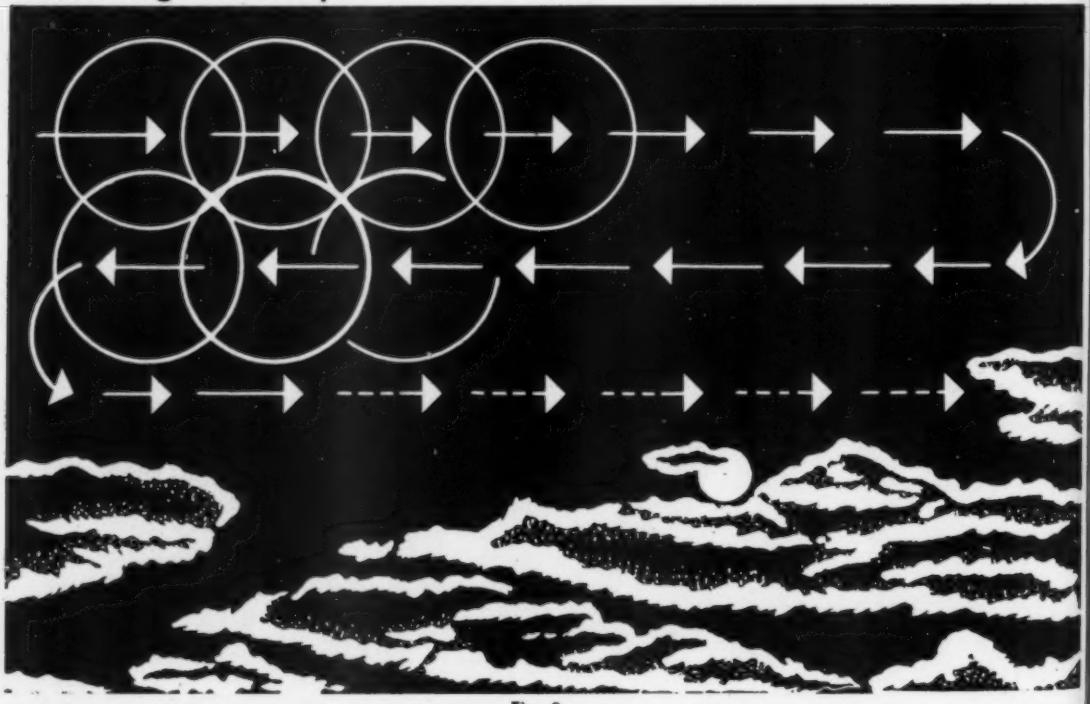


Fig. 2

Light, Dark Adaptation

Without going into the complicated physiology of the subject, let's briefly consider light adaptation and dark adaptation. Slight changes in the concentrations of the photosensitive chemicals in the rods and cones can greatly alter their sensitivity. Bright light reduces concentrations of photochemicals in both rods and cones. This process is reversible. If you remain in darkness for a long period of time, the photochemicals build up until it takes only a tiny amount of light to excite the visual receptors. This build up is dark adaptation. The cones, however, can never achieve anything near the sensitivity of the rods to dim light.

Dark adaptation is best performed in total darkness. However, because rods are not sensitive to red light, if you wear light-tight red goggles, you can become dark adapted in a lighted room while you read, talk or attend a briefing. At first your cones adapt much more rapidly than your rods and your sensitivity to light increases 10-fold in the first few minutes after you enter darkness or put on red goggles. After a short time the cones stop adapting but the rods continue. At the end of 20 minutes, your rods will have become 6000 times as sensitive as before and in a 30-minute period, 10,000 times as sensitive.

An important fact to keep in mind is that continuous exposure to intense sunlight for several hours can cause your dark adaptation threshold to rise. This effect is cumulative and takes several hours to wear off. For this reason, if you have a night flight scheduled, it is most important to wear dark glasses when at work or play in brilliant sunlight.

Protect Dark Adaptation

The dark-adapted eye briefly exposed to bright light is only temporarily impaired and can resynthesize its photochemicals in a short period. The extent of impairment depends on the intensity and duration of the light exposure. If possible, avoid looking at the exhausts of other aircraft. Inside your own cockpit, use the lowest lighting possible. You should be so thoroughly familiar with the location of your controls that you don't need a great deal of light.

Dark adaptation is a separate process in each eye. By closing one eye during exposure to light you can protect half your night vision.

Oxygen Lack Affects Night Vision

The retina of the eye is more sensitive to lack of oxygen than any other part of the body. In addition, blood circulation in the rod area is less efficient than in the center, the cone section. Because of this, hypoxia, smoking, alcohol and positive G forces all affect night vision.

A minor degree of hypoxia which would not affect your vision in the daytime can diminish it considerably at night. There is a 20 percent loss of night vision at 10,000′ if oxygen is not used.

Smoking reduces the amount of oxygen available to the eyes because blood cells take up carbon monoxide much more readily than oxygen. More carbon monoxide in your blood stream means less oxygen for your rods with resulting diminished night vision. Chain smoking three cigarettes produces a CO blood saturation of 5 percent, the equivalent of raising your physiological altitude to 8000′.

Alcohol produces a similar effect by making the body tissues less receptive to oxygen in the blood. One authority reports that a study has shown that after ingestion of 180 cu. cm. of alcohol (you figure the jiggers), the sensitivity of the eye was so impaired that a light had to be doubled in brightness for it to be seen.[1]

Positive G forces cause tunnel vision which is simply the result of loss of peripheral vision. This, too, is a circulatory effect. The heart just can't pump enough oxygen-carrying blood to the eye and brain to maintain business as usual.

Autokinesis

No discussion of night vision is complete without mention of autokinesis. As you will remember from the night vision demonstration at the physiology training unit, autokinesis is a visual illusion in which a single small stationary point of light, against a uniformly dark background and in the absence of all visual cues, appears to move aimlessly. The effects of autokinesis can be minimized, in night formation for instance, by not looking steadily at any point of light, by having as many other visible objects in view as possible and by being very suspicious of sudden irrational light movements.

Another common illusion at night occurs when an approaching or receding light seems to expand or contract at a fixed distance. Here again, shift your gaze.

Dirt, grease and scratches on your aircraft canopy or windscreen break up and refract light and make it more difficult for you to see. Obviously, clean unscarred window surfaces and canopies will help your night vision.

And finally, personal physical fitness improves all systems, night vision included.

[1]McFarland, Ross A., *Human Factors in Air Transportation*, New York: McGraw-Hill, 1953, p. 297.

Five Seconds and OUT!

When an F-4B went over the side on a cat shot, the RIO, whose story this is, survived because of his alertness. According to the investigating flight surgeon, the RIO always tries to give himself the maximum time available to perform an action. As was his custom on the catapult, he sat erect with his head back. He held his left wrist in his right hand with his left hand poised over the seat pan firing handle, guard down. Apparently he ejected at the end of the fifth second after start of the catapult shot.

"In a normal catapult launch," the RIO begins, "one notices first a very slight 'false start' which is, I think, caused by the initial movement of the shuttle putting further tension on the bridle. (Externally one notices the aircraft 'set' slightly, the

nose raising just a little.) Close on this action, there is a shearing noise that is both heard and felt as the holdback fitting breaks. Immediately after this one feels the acceleration of the stroke pinning him to the seat and an accompanying sound somewhere between a 'whoosh' and a sound like roller bearings. All of this, of course, is extremely rapid timewise.

"In the launch that day, we got the initial 'false start.' Then, as I recall, I heard the holdback break but there was no acceleration sufficient to press me back in the seat. Right after the holdback—and it is difficult to assess the objective timing—I heard a loud 'bang.' My thoughts were that either something had exploded (a tire or a tank) or that something had hit the aircraft.

"After the loud bang, the aircraft started to decelerate. Then I recall that the plane lurched to one side—I can't really remember which way. All of this was extremely fast and I realized something was wrong and made the decision to eject almost at once. Somewhere in the extremely short time between the loud bang and when I closed my fist around the ejection handle I heard the pilot call 'Get out, Bill, eject!' I was pulling the handle as he said this. *(The pilot apparently did not eject; he was not recovered.—Ed.)*

"It seems, subjectively, to have been a long time span in which these events took place, although I know it was no more than a couple of seconds. But each individual observation is a distinct one which I can remember vividly. I even recall seeing black smoke to starboard sometime during the above events.

"As I pulled the handle, I felt and heard the loud bang of the cartridges and felt a sharp pain across my back just below my shoulder blades. (*This was a moderate back strain requiring 14 days' grounding.—Ed.*) Ejection itself was no problem—one smooth pull on the handle.

"What happened until I reached the water was a series of quick flashes of things happening around me. I first noticed (looking downward between my knees) the turtle back of the aircraft. I was 90-degrees to the fuselage then. I saw flames but little or no smoke. (I remember thinking initially that I was seeing the flash of the seat pan and, then confusedly thinking,

'Hell, it's not a rocket seat.') Then I realized the flames were on the aircraft.

"Next I remember looking down at the water and wondering if the chute was going to open. I was almost convinced it wouldn't. I instinctively moved my hands toward the risers and, as I did, felt them go taut. Also at this time—just a split second before I hit the water—I saw the aircraft again, this time pointed sharply downward and port wing down. There was a thick cloud of smoke but the basic form of the aircraft, dirty gray, almost black was discernible.

"What happened next, in order, is very confused. I recall seeing the splash and a loud explosion but I am unsure if it occurred before or after I was submerged. Furthermore, I am unsure whether or not I entered the water still in the seat or not, but I think I was either still in the seat or it was just separating since my legs were unrestrained. I remember, when I heard the explosion, being concerned about flaming debris, but it was only a fleeting thought. There was little I could do about the debris anyway.

"I entered the water without my Mk-3C inflated and with the collar of my Mk-5A anti-exposure suit unzipped. I didn't go very far under. I recall as I reached the lowest depth, my mask (bayonet fittings) ripped free on one side. My helmet visor was still down from before the cat launch. I took on a little water in the anti-exposure suit but there was no discomfort. I had no trouble surfacing. I was quite dazed and looking back, it seems I was both slow in performing the various steps of sea survival and a bit confused about things as the following indicates. Again, the time element, subjectively, seems to have been very long.

"The first thing I noticed was that the poopy suit alone was providing buoyancy. I recall trying hard to remember what I was supposed to do, and then remembered the toggles on the Mk-3C. I had forgotten to fasten the center connectors, but this offered no problem either for inflation or for flotation thereafter.

"As I looked toward the ship, there was still a moderate 'roar' to be heard and water was still settling from the splash/explosion of the aircraft. The ship was bathed in smoke, almost completely obscured from my position. It seemed as if I were a long way off but I think this may have been an illusion due to the dense smoke. At this time I heard the ship's whistle and I remember thinking, because of the smoke, that there was a fire on deck. I remember at this point trying to see if I could see the pilot in the water around me. After the Mk-3C was inflated, I saw the chute alongside in the water and again had to think a moment before I realized its significance. I released the koch fitting with no difficulty and slowly moved my feet and arms away to avoid entanglement.

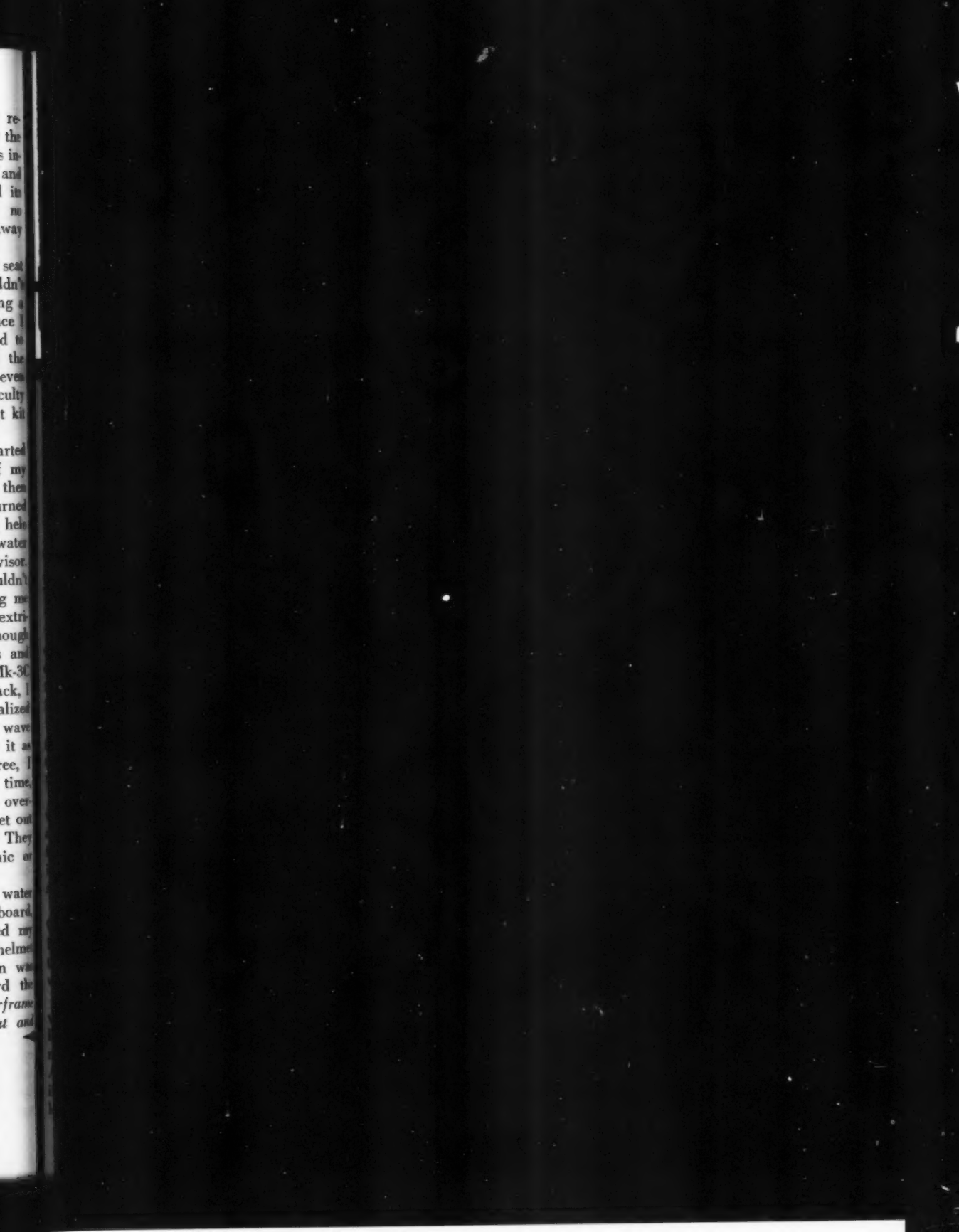
"Briefly I debated inflating the raft but the seat pan had slipped to an awkward position and I couldn't reach the kit release handle without experiencing a sharp pain in my back. I elected to let it go since I was so close to the ship and the Mk-3C seemed to be holding me afloat satisfactorily. Release of the rocket jet fittings proved to be a problem even though I had no gloves on. I had some difficulty finding the apple of the upper block as the seat kit fell away from me.

"I looked up and saw two or three helos. I started to swim away from the chute but because of my back couldn't achieve a very satisfactory stroke. I then noticed something was holding me back. I turned slowly to see what it was just as the first helo came overhead. There was a lot of JP-5 in the water and the spray was blinding me in spite of my visor. I remember cussing out the helo because I couldn't seem to free myself from whatever was holding me and felt that if they would move away I could extricate myself easily. Somehow I was able to see enough to ascertain they were the drogue chute lines and they seemed to be lodged up underneath the Mk-3C in back of me. Again, partly because of my back, I couldn't reach the point of connection and realized I would have to cut them. I was hesitant to wave the helo off since I feared they might mistake it as an OK signal and if I later couldn't get free, I thought I might need some help. About this time the first helo left and before the second came overhead, I was able to see better and thus could get out my shroud cutter and go to work on the lines. They were quite tough to cut but caused no panic or problem.

"Once free, I headed for the hoist seat in the water and with little difficulty got to it. I climbed aboard, held on tightly and was hoisted up. I banged my head and leg on the side of the helo but the helmet absorbed the blow to my head. The crewman was expeditious yet careful in getting me aboard the helo." *(This accident occurred prior to Airframe Change 307 which incorporates the H-7 seat and sequence system.—Ed.)*

Wisdom denotes the pursuing of the best ends by the best means.

Frances Hutcheson (1725)



the ninth rescue

Smooth was the word for the helicopter rescue of a jet pilot three miles off the enemy coast in day VFR combat conditions. However, the rescue situation was by no means uncomplicated. The pilot became tangled in his tree landing lowering line and the river delta water was so muddy that underwater, the rescue crewman could see only 2′. Luckily, enemy shore batteries did not come into action. This was the ninth Tonkin Gulf rescue for the unit.

Here is the jet pilot's own description of events which took place in rapid succession after his aircraft was hit as he came off target heading. As he crossed the coastline, his afterburner section on fire, the PC system failed; within moments control failure followed.

"I knew at that time I was going to have to get out. The aircraft pitched over to a nose-down attitude heading for the water. I reached between my knees and pulled the ejection handle.

"The chute gave a definite pull on opening and I was soon settled down to a nice easy descent. The aircraft, still in a nose-down attitude, was streaming fire and heading for the water. My aircraft crashing into the sea below me was the saddest thing I've seen in my 11 years of flying.

"I must have descended for five minutes or so. Other aircraft were in the area circling my chute so I knew that the SAR had started. As I came closer to the water I could see not only one but two helicopters waiting for me. It was a good feeling.

"The raft was fairly easy to pull out and prior to water entry I had it inflated along with my Mk-3C life preserver. As my raft hit the water, I unfastened my parachute harness fittings and entered the water. As I bobbed up to the surface I held up my hand to indicate that I was OK and saw that a crewman had left the helicopter and was in the water with me. It surprised me that it would be that fast.

"I didn't even have time to get into the raft. The crewman asked me how I felt and I told him I was OK but that I had some line around my feet. He checked to make sure that the parachute was free and, after pulling me away from it, started diving under the surface of the water to untangle the line around my feet. The line was 125′ of lowering webbing used in case of a tree landing. The water was very muddy and I knew it was going to be difficult for the crewman to free the line.

"Shortly the crewman came to the surface and told me I was free of the line. Then he pulled me out a little further from all the entangling debris. At that time he signalled the helo and within seconds it was hovering over us. The crewman hooked up my D-ring and then his own. It seemed odd that we were both being hoisted up into the helo together—that is one thing I never expected. It was a good feeling to get inside that helo cabin and head on out of there.

"Looking back, I can see the advantage of years of training and experience throughout the entire sequence of events. I did not have to think about what to do; it all came naturally to me. Even before I realized what I had done, I had secured my engine, ejected and was descending in the parachute. I took out my raft, inflated it, inflated my Mk-3C and prepared for water entry. Everything worked as briefed.

"My rescue came off like clockwork. The helo pilots and crew knew their jobs very well and performed them in an outstanding manner. Time in the water was held to a minimum. I have nothing but praise for the entire helo crew in effecting my rescue within sight of enemy-held land. They are a professional group doing a highly professional job and today was no exception." ◄

notes from your flight surgeon

Unusual Prop Injury

A PROP injury which can only be termed unique was recently reported to the Safety Center.

After takeoff on a local training mission, an S-2F pilot was unable to retract the landing gear. After landing, he wanted to maintain hydraulic pressure until the landing gear safety downlocks were installed. The copilot tried to convey his intent to the ground crew by hand signals but the crew did not understand. The copilot then opened his overhead hatch, stood in the seat, and was pointing to the main landing gear when he inadvertently stuck his hand into the starboard propeller arc. The prop struck and gashed his right index finger three times before he could draw his hand back. The engine was at IDLE, approximately 800 rpm.

The copilot's injury required 11 stitches to repair. The aircraft was undamaged. "The man involved is one of the most safety conscious and professional pilots in the Navy," the squadron commanding officer wrote in his report. "He has an impressive number of hours in type and is a NATOPS instructor in the S-2 aircraft. Yet a few moments of preoccupation and inattention resulted in what could have been a major injury. He is most fortunate not to have lost his finger or even his entire hand. His wearing of flight gloves probably helped minimize his injury." (See photo, left.)

None of the S-2 pilots and aircrewmen questioned at random had until this time thought that it was possible to reach into the prop arc from the cockpit, the C. O. reported. Investigation on a static S-2 showed the prop arc to be easily accessible.

Safety Tip

IN a 1st MAW accident, three aircrewmen who were wearing nylon canvas-sided jungle combat boots received first and second degree chemical burns on their insteps and ankles because their feet got soaked with 115/145 fuel from a ruptured fuel tank. The parts of their feet protected by the leather portions of the boots were not injured. Reason enough to avoid the jungle combat boots in aircraft!

Here are a few other reasons:

- *No steel toe protection*—Toe protection is a must for ejection seat aircraft.
- *Inadequate ankle support*—Ankle support is a must for chute equipped aircraft.

—The Professional, 1st MAW

Ed. Note: Jungle combat boots are not authorized for air crews.

Never Assume

IN HIS rescue report, a SAR helo pilot points out that one of the survivors in an A-6A accident did little to facilitate his location by SAR personnel. After parachute descent onto a sandy beach, he apparently thought he had been spotted because of the large number of aircraft overhead. Instead of displaying his parachute, he had it neatly folded beside him. He used no means of signaling except for a night flare which SAR personnel said was hard to see in the daylight.

The SAR copilot's comments, which appeared in an Air Group publication, are worth considering:

"After 12 years of helicopter

flying and participating in numerous searches, several of which ended without results, it oftentimes appears evident that the rescued individual is an awfully, awfully lucky person.

"In this case, naturally, it was only a matter of time since the survivor was on dry land in the open, but it might have been a very, very long time for him, and with him AOCP for a right ankle, it would have been a lonesome wait on that beach. He had a parachute, a mae west, a raft with smoke flares in it, a mirror and a high visibility signalling panel, plus some real expensive other gear. None was observed in use. Except for the small puff of gray smoke when he lit the night flare, we would have gone by since he was well outside the area assigned to us for search.

"If there can be a summation for this account, it can only be that which has been written, lectured, and put in bold type on the 'Read and Initial' board. *Never assume you are spotted until the pick-up crew holds his hand out to you.* Old Uncle pays dearly for your training and outfitting in paraphernalia and surely won't mind your experimenting with it when you're cooling your heels on some lonely piece of geography with nothing else to do because your cigarettes are wet. In that environment, the least visible thing usually from horizon to horizon is a flight suit in the vertical position."

Gunny Sack

OPENING parachute shock was excessively rough, an A-4B pilot reported after ejection. However, his torso harness which was too large scraped and bruised him on the chin and neck. The rocket jet fittings were so high he could reach them with his finger tips only. Later he said he felt as if he were looking out of a gunny sack. He landed in a farmer's field. When the chute collapsed he was able to release the fittings. An overwater landing might have been another story.

"The choice of properly fitting flight gear must ultimately rest with the pilot," the investigating flight surgeon commented in his report. "The continual use of improperly fitting gear should not occur. There is every indication that the proper size torso harness, if not originally available, could have been obtained subsequently, had the pilot pursued the matter."

'Stupid Move'

THE most serious injuries sustained by an F-4J pilot in a ground level ejection were second-degree burns of both hands as he went through the fire ball. He was not wearing gloves.

"I took off my gloves while sitting in the cockpit to strap in," he told investigators afterwards. "I just forgot to put them back on—a real stupid move!"

Gloves would have prevented his burns, investigators reported.

Hay and Histamine

THIS is the time of year in which ragweed pollen causes hay fever east of the Rockies and pollens of the chenopod-amaranth families (pigweed, etc.) cause hay fever in the western states. In ConUS in the spring there is hay fever due to wind-borne tree pollens and in the summer, grass pollens or fungus spores. In many other areas of the world there are other pollens and spores which produce the same results.

Hay fever can cause nasal congestion severe enough to block a sinus during penetration or descent and cause severe and incapacitating pain. Antihistamines for hay fever produce drowsiness and other symptoms incompatible with flight safety. Don't self-medicate. Check your troubles out with your local flight surgeon. And keep in mind the hazards of hay fever and antihistamines as related to flying no matter where in the world you are.

"If you keep sniffing that stuff, Orville, we'll never get off of the ground."

Aircraft can not always be in super brand new shape. Consequently, it is common practice to accept certain discrepancies. And sometimes, the decision to go or no-go is treated too casually.

Yellow Sheet Discrepancies

When a car has a mechanical malfunction, the driver can almost always stop safely over to the side of the road. In the early days of aviation, the slow airplanes could often glide (dead stick) to a relatively safe emergency landing in a pasture or a road (there were far less cars then).

As aviation progressed, dead stick landings began to lose their popularity in favor of bailouts. Then with the advent of high-subsonic and supersonic tactical jets, forced ejection took over. Ultimately, it became mandatory to punch out from most jets.

Space Program Malfunctions

If vehicle abandonment should be required in the space program, it has been concluded that individual crew ejection would be unworkable once out of the earth's atmosphere. Consequently, a new engineering title of precision has been born as the most feasible substitute—*Zero Defects*. This means that space vehicles and their intricate systems must be so per fectly manufactured and multi-inspected that failur is unthinkable, impossible and disallowed. The Nava Material Command has joined the chorus by naming their new publication "Call Sign: Z D, for Zer Defects,—right the first time."

FIRE
PRESS TO TEST
Please turn page

Preflight inspections are important.

Perfection is Difficult

Where possible the term *zero defects* is being squeezed into the production of tactical aircraft but quantity demand has curtailed its extensive effectiveness. Moreover, wars are still fought down on this earth and hits from enemy fire ruin the *zero defects* theme. Therefore ejection is still the most feasible and popular survival solution.

No doubt some pilots would like to see *zero defects* make aircraft yellow sheets a mere matter of record to prove that the aircraft had been inspected and was in perfect condition. Then they would never have to accept for flight an imperfect aircraft. Unfortunately, if this was the present rule, flight operations would be curtailed and readiness would suffer in turn. Consequently, calculated compromises must be made so it is common practice to accept aircraft with understandable non-safety-of-flight discrepancies.

Often, for various reasons (such as parts non-availability), some discrepancies can not be immediately corrected and if the malfunctioning items will not prevent mission accomplishment, the plane can be flown. One problem is that all pilots will never agree as to just what types of discrepancies one should accept and not accept. In actual practice most such sorties are safely and satisfactorily completed in spite of the known handicaps.

If this acquiesence to imperfection had not been a hand-me-down from the early days of aviation, aircraft progress would not be anywhere near as far advanced as it is today. Moreover, we might not have won any wars wherein aircraft have proved to be a useful tool and/or weapons system.

Mission Urgency

If safety-of-flight is not a problem, the urgency of the mission must be weighed against known aircraft discrepancies in order to make a final decision to go, no-go.

Pride often gets into this malfunction act because many pilots are inwardly concerned that their comrades may think them to be "chicken" if they down an aircraft for debatable working order of certain items. On the other hand, a few pilots will seize the slightest opportunity to cancel a sortie.

There are literally dozens of discrepancies which will not affect aircraft safety-of-flight but they might prevent mission accomplishment. And if the mission is for real combat, it might be a needless risk to get airborne.

Well, so much for perfection, let's look at some recent examples.

Haste Makes Waste

A *Crusader* squadron was deployed for two weeks of intensive aerial gunnery practice. During such short allocated periods, most squadrons try to set records for the number of hours and sorties. Consequently, it was almost a 24-hour operation considering that most maintenance had to be done at night.

One division leader had completed his alloted three daily missions and normally would have been through for the day. Another leader on the schedule, however, did not feel well so the other man was happy to go out for the fourth time. Before the four-pilot division had completed the specified briefing, the leader was informed by the operations officer that the banner towplane had gotten off early. This required an almost immediate takeoff if they were going to get in any shooting before the towplane reached bingo fuel. Consequently, the briefing was summarily condensed and concluded.

Don't Worry About the Light

The assigned lead plane yellow sheet was marked UP but noted thereon was the fact that on the last seven hops the engine fire-warning light had illuminated in the landing pattern. The maintenance officer had concluded that the red light was only intermit-

Crusaders ready for an all-out gunnery record.

Weak brakes put this F-8 in trouble.

tently illuminating because of a loose electrical connection somewhere in the line. The two-week maximum effort overruled downing the F-8 until the "unimportant" short could be found and corrected. The pilot reluctantly accepted the aircraft in the spirit of the maneuvers.

Weak Brakes + Hydraulic Leaks

No. 4 pilot accepted his *Crusader* in spite of yellow sheet notations that the last six pilots had reported spongy and weak brakes. On top of this, during the same period, the plane had been downed for utility hydraulic failures three times. The hydraulic leaks had been stopped each time but nothing was done about the brakes because it was considered that the other discrepancy had caused the poor wheel decelerations.

Red Light Leads to a Near Midair

The division got airborne, Lead deselected afterburner about 2 minutes after takeoff and quickly thereafter noted that the fire warning light came ON. This motivated a routine (as opposed to a hurried) abort so Lead told No. 3 (the second section leader) to join him and look for evidence of fire. At the same time Lead told No. 2 and 4 (the two wingmen who were relatively inexperienced) to form a section and carry out the gunnery mission. No. 2 did not hear his instructions and about a minute later almost collided with his leader who had *assumed* the wingman had already executed an immediate breakaway.

After fear subsided from the near midair, Lead tried to concentrate on his red light situation and was somewhat relieved when No. 3 told him there was no evidence of an external fire.

Where Is Everybody?

Meanwhile, the towplane pilot broadcast that he was getting close to bingo fuel. This motivated Lead to momentarily delay his problem solution as he transmitted for Nos. 2 and 4 to report their progress. The answers were not gratifying because the two wingmen could not find each other or the towplane.

Lead was then given a slight respite because his warning light went out. Regardless, he proceeded with his plans for a no-delay landing. The tow pilot then informed Lead that he had reached bingo condition and was heading home. The two wingmen still reported no joy on the towplane or each other. Then No. 2 reported two quick successive messages, 1: he could see the towplane up ahead and, 2: he had just collided with something. Less than a minute later the tow pilot reported banner loss. After a few moments of silence, No. 2 reported that he had lost a foot or two from his starboard wing tip but he

had things under control. It was later proved that the *Crusader* wing tip had received the gash as a result of cutting the banner tow cable.

Lead instructed No. 2 to slow flight his bird and then report back. After a safe control report, Lead then instructed No. 2 to make a precautionary landing. Quickly thereafter Lead and No. 3 landed safely.

Landing Troubles

Three minutes later, No. 2 goofed his approach by landing 20′ short and upon reaching the runway its concrete edge blew his port tire. Fortunately, there was a lot of runway and No. 2 caused no more trouble as he safely slowed down and got clear of the runway before securing the aircraft for maintenance to take over.

Nerves had no time to calm down after No. 2's hairy landing when No. 4 announced he was entering the pattern with utility hydraulic failure. After a short and normal touchdown, No. 4 tested his brakes immediately with the plan of an emergency arrestment if they were weak. The brakes were on the money until the temperamental bird had gone past the cross-runway pendants, then they failed completely. The pilot was able to bring the F-8 to a safe stop 100′ off the end of the runway by actuating the emergency air brake which then blew both MLG tires.

The Red Light Was a Prelude of Real Trouble to Come

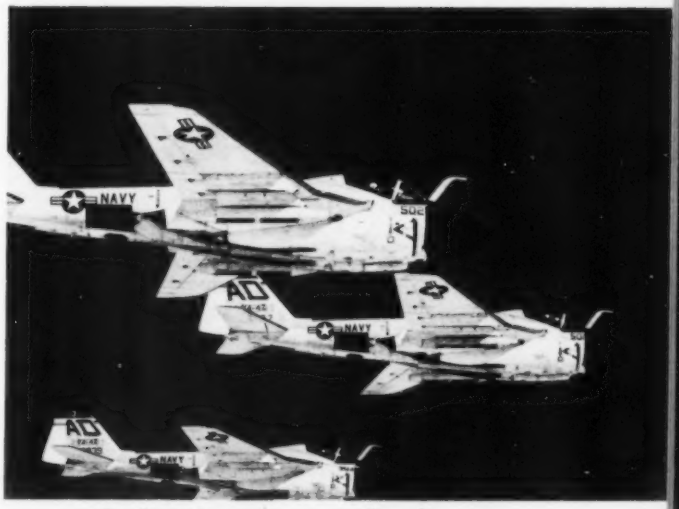
Lead definitely grounded his F-8 demanding the red light trouble be positively corrected. Subsequent findings proved how foolish it was to have accepted the bird. Ground check runs in afterburner started a real fire which sent the aircraft to overhaul and one mechanic to the hospital with painful burns.

Does Formation Flying Make It Easier?

In general, mechanical defects can be associated with safety-of-flight problems while malfunction of navaids need not normally be so connotated. In other words, in VFR conditions, navaids are desirable but not mandatory because pilots should be able to get by using a map and dead reckoning. To takeoff, however, on an IFR flight plan with a combination of mechanical and electrical discrepancies invites trouble.

Such circumstances occurred within a formation of three A-6As. It was hoped that the good working systems of one aircraft would surmount the discrepancies of the other two.

The Lead had good navaids but fuel transfer problems. No. 2 had a bird with intermittently temperamental radios and navaids. No. 3 had no mechanical malfunctions and a good two-way radio but no navaids.



Do three planes make one good one?

There seems to be some get-home-itis in the reasons for blasting off, and the IFR plan was only necessitated by a reported line of thunderstorms enroute. Soon after reaching the assigned cruising altitude of FL 350, all three experienced a need for defogging their windshields. Then the Lead and No. 2 discovered their defoggers did not work. Before this problem could be solved, Lead's worries were diverted by the reappearance of the fuel transfer malfunction. Meanwhile the formation was able to stick together by looking out windshield sides while Lead hit the gages.

Who Should Abort?

Lead did not take long in making the wise decision to abort to a suitable nearby alternate. No. 2 stated that his suspected radio and navaid trouble appeared to have been corrected so he would continue. No. 3 felt that his situation was no worse so he would continue flying wing on No. 2. Continued

As forecast, the thunderstorms soon made their appearance and the new lead went to 100 percent with the intention of climbing over them. This he commenced without informing ATC and he felt his actions were all right as long as VFR could be maintained. As experienced pilots have found out, thunderheads have a nasty habit of out-climbing man's iron birds. True to form, *Intruder* stalling speed and cloud contact occurred simultaneously. No. 2 last observed the new Lead snap into a spin. Not desiring the same maneuver, he pushed forward to regain airspeed and went to the gages. He was VFR in about another minute on the other side of the front. Lead was almost as lucky as he recovered from the spin at FL 190 also on the other side of the thunderstorm line.

Would you believe it, they joined up and got home without further incident.

In retrospect, *if* the original Lead had not had fuel transfer problems, he might have stuck to the IFR plan and led the other two straight through the cloud fence which proved to be thin at the assigned cruising altitude. Then the subsequent ATC violation *might* not have occurred—and a routine cross-country accomplished. *But*, unusual and unexpected things did happen and this incident came close to being logged in the accident files.

It would appear that the original Lead did all of the right things. His discrepancy was noted on the yellow sheet to have been fixed. When he discovered the reappearance of the same malfunction, he rightly and safely aborted. A decision of the others to continue would be considered acceptable *if* they had adhered to the IFR plan—but they did not.

It Is a Tough Decision

Every aircraft model is different, be it ever so minute, and as each one records operational history, flying peculiarities become better known. Then steps are taken to either live with certain not-so-perfect mechanisms, while making requests for proper fixes, or ground the aircraft until satisfactory fixes are incorporated.

It would be nice to have as SOP that all aircraft are grounded until yellow sheets indicate *zero defects*. Unfortunately, this is still a dream for present day operational combat squadrons.

If a pilot has qualms about accepting an aircraft with questionable discrepancies he should seek out a truly competent and responsible person to pass on the ramifications of accepting an aircraft with the specific defects. Then after taking all factors such as safety of flight, type and urgency of mission into consideration, a firm decision can be made as to *go or no-go*. ◄

Yellow sheet comments are important.

NOTES AND COMMENTS ON MAINTENANCE

Detectives . . . First Class

A RECENT incident at Key West points up the value of being able to add 1½ and 1½ and come up with the answer of 4. It also illustrates the necessity for all you maintenance people to have a bit of the detective in you.

An F-4B aborted on takeoff because of severe nose gear vibration. Check of the gear showed the knee bolt was gone. Search of the runway did not locate the missing bolt, nut, or cotter pin. Because there was no evidence otherwise, the failure was attributed to personnel negligence in not installing the safety pin.

That night, during the FOD walk, somebody found a broken bolt, but pitched it in the trash can. This was 1½ of the above equation. Next morning's walk turned up a nut and a cotter pin intact, with part of a bolt still in the nut. This was the other 1½, but it didn't total 4 because this stuff also got tossed in the can.

Not until the men were talking among themselves did they realize the significance of their separate discoveries. Both items were fortunately recovered from the trash. Fault for the gear failure was then properly placed on the item of material and not on the people who installed it.

We certainly realize that not everything you pick up along the line has significance to something else, and that you can't stockpile every nut, bolt, and cotter pin you find. That's where the detective work comes in.

Unless your line area is used as a part-time drag strip, chances are good that any objects you find along it came from one of your airplanes. (So far as we know, nobody goes up and down the line strewing old nuts and bolts just to complicate the task of maintenance.) Therefore, you should make the assumption that since the foreign object had no business on the line where you found it, it's missing from where it should have been. Where should it be? What may have happened today or yesterday that *could be related to your discovery?*

Show the object to the proper person; maybe he can make the necessary link between object and incident if you can't. Always assume your discovery is important until you know for sure it isn't. Then and only then should you trash-can it.

—McDonnell-Douglas

Mismatched P-3A Starter Couplings

DURING routine maintenance following an 11.2-hour patrol, the No. 3 engine starter in a P-3A was found hanging by the starter inlet air duct. Molten metal and the starter coupling were found below the starter in the engine nacelle.

The cause was attributed to failure of the coupling assembly which allowed the starter to move aft and drop down. The rotating drive shaft assembly contacted the starter gear housing and rear of the starter hub, then friction heat caused extensive melting and fracturing of the starter drive shaft, gear housing, gear hub and the reduction gear box starter drive assembly. An engine change was required.

It was determined that a Hamilton Standard coupling had been mismatched with an Airesearch starter. Investigation of this situation revealed another engine (QEC) had an Airesearch coupling mismatched to a Hamilton Standard starter.

Be on the alert for proper matching of starters and their couplings as the environment for engine fire is ever-present in the event of a mismatch.

P-3 MLG Wheel Halves

What's Wrong Here?

P-3 Main Landing Gear Tire and Wheel Assembly—Ready to Roll? Hold it—somebody goofed! If you can't spot the error, please turn to page 45 for the answer.

When a Lubricant is

NOT

a Lubricant

PERHAPS one of the oldest principles in dealing with machines is that a drop of oil in the right place makes a very great difference in operation. Earlier machines did not seem to object much to the type of lubricant, but responded gratefully (for a time at least) with reduction of squeaks, friction, and wear. However, as time passed, the simple machine was compounded for greater performance. The environment changed too, with extremes of temperature, speed, and load not uncommon. Obviously then, the type, quality, and the quantity of lubricants (greases, oils, preservatives, etc.) became a matter of increasing importance to meet the needs of the machine. For example:

- High speed bearings require a relatively low viscosity lubricant. Heavy lubricants produce excessive heat which can induce premature bearing failure.
- Some hydrocarbons absorb moisture, causing corrosive attack of the wetted metals. While this is not an important point on some applications, serious failures can be produced on intricate, close-tolerance devices such as jet engine control components by the use of lubricants with excessive entrained moisture.
- The type and amount of lubricant must be compatible with all of the materials with which it comes in contact. It does little good to lubricate a bearing perfectly if the adjacent seal is destroyed by the lubricant. Similarly, it does not make sense to use unnecessarily large quantities of lubricants which will contaminate and jeopardize the operation of another system vital to the machine. Hence, the amount of lubricant is often as important as the type. (There is a basic fallacy to the phrase, "If a little is good, a lot is better!")
- The lubricant must be capable of withstanding the temperature of its operating environment and still remain a lubricant. A good low-temperature lubricant is seldom, if ever, a good high-temperature lubricant. Improper use of lubricants with respect to temperature requirements has resulted in carbonization of the lubricant, producing seizures, heavy wear, and system failures. Several of the current high-temperature lubricants feature a molybdenum disulfide additive in a silicone vehicle or carrier. These lubricants do not carbonize or break down within their rated temperature. However, if such a lubricant is diluted (or "thinned") with a hydrocarbon oil such as Mil-L-6081, the effective temperature rating is lowered considerably. As a result, the lubricant may carbonize or break down during service, with consequential bearing failure or other damage.

These are just some of the factors which must be considered prior to the selection of a lubricant to meet a specific need. The moral of the story:

- ✔ Use only the specified type and amount of lubricant. If the type required is not available, obtain the necessary authority before substituting.
- ✔ Do not use unauthorized mixes, thinners, preservatives, or additives. The results could produce bearing failure or other damage.
- ✔ Be sure to check specifications and stock numbers on new containers.
- ✔ Be sure that secondary containers (such as oil cans) are clean, guarded against contamination, and are well marked for content.

—GE "Jet Service News"

MURPHY'S LAW *

Wheel Bearing Identification

**A wheel bearing is a wheel bearing . . .
but it may be the wrong wheel bearing!**

A4C Mismatch

Mismatched wheel bearings was the topic in the March 68 issue calling attention to Murphying of inner and outer wheel bearings in the A-4C.

Additional reports bring to light another booby trap involving wheel bearings for this aircraft. This time a wheel appeared to be "loose." Investigation revealed that a bearing for a cast aluminum wheel had been installed in the inboard wheel race of a magnesium wheel. These bearings are *not* interchangeable because the bearing for a cast aluminum wheel, PN 9533148, will fit too deeply into the race of the magnesium wheel, PN 932234.

It was recommended that A-4C MRCs (Maintenance Requirement Cards) be modified to identify bearing and wheel assembly combinations by part numbers to preclude a mismatch.

F-4B/A-6 Mismatch

Investigation of a series of F-4 wheel bearing failures revealed that A-6 outer wheel bearings, PN L217849, had been inadvertently installed in place of F-4 inner wheel bearings, PN 27690 during wheel and tire buildup. A check of RFI bearings revealed additional mismatched sets ready for installation. The similarity of these bearings in appearance sets the stage for a Murphy in maintenance activities which support both models of aircraft.

Further investigation also revealed that bearing L 217849 is used on E-2A wheels.

It appears that the recommendations involving the A-4C might well be adopted by the concerned IMAs as well. *Maintenance activities supporting F-4/A-6/E-2 aircraft please take note.*

*** If an aircraft part can be installed incorrectly, someone will install it that way!**

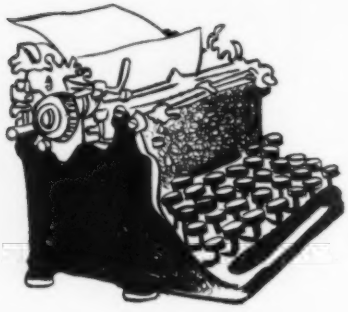
What's Wrong Here?

Continued from page 43.

P-3 MLG Tire and Wheel Assembly—Ready to Roll! Wheel halves are correctly matched—Note the unfilled cooling holes. Mismatched wheel halves depicted on page 43 could easily result in hot brake and weakened wheel structure combination!

Many an argument is sound, and only sound.

Anon.



Letters

Approach Plate Holder For P-3 Aircraft

FPO, San Francisco, Calif.—LT Steve Martin, the Squadron Quality Control Officer of VP-28 has developed an excellent approach plate holder which is depicted in figures (1), (2) and (3). The proposed holder has the following advantages:

a. It is easily mounted. The arm on top left side of the holder fits over the windshield wiper drive rod and the right side of the holder device incorporates interlocking flanges that fit securely on the underside of the glareshield.

b. The mounting is rigid and not susceptible to swaying or movement in the event turbulence is encountered.

c. The designated holder does not interfere with the power levers in the full forward position nor actuation of the windshield wipers or yoke movement.

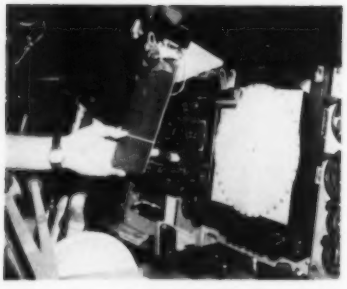
d. The light mounted on the clip is a plotter flood light with a wire lead that is plugged into the presently installed plotter light receptacle. The light is rheostat controlled and can be utilized with either white or red light and the light intensity can be controlled as required or desired by the pilot.

The above design has also been sent to Lockheed Aircraft Corporation through the squadron technical representative, Mr. Bert Woods.

R. R. HEDGES
COMMANDING OFFICER
PATRON TWENTY-EIGHT

• Since receiving the above from VP-28, similar submissions have been received from VP-4 and VP-6. Thanks to all of you.

1



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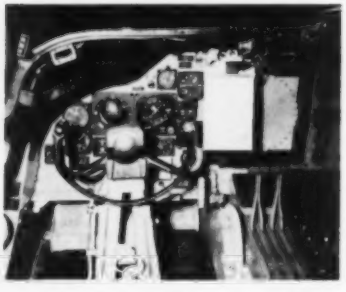

3

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, U. S. Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Safety Center.

NEW EDITOR

LCDR CLARK enlisted in the Naval Aviation Cadet Program in 1953 and received his commission and wings at NAS Hutchinson, Kansas in December 1954. Assigned to VP SEVENTEEN, he completed two operational deplcyments to the far east, the second deployment as a Patrol Plane Commander. In 1958 Mr. Clark attended GCA School at NAS Olathe, and was subsequently assigned to RATTCC 43 at NAS Cecil Field. LCDR CLARK attended General Line School at Monterey for 9 months in 1961 and, following a brief training period with VP THIRTY ONE, was then assigned to VP TWENTY TWO at NAS Barbers Pt. In addition to his duties as a PPC, Mr. Clark served as ASW Tactics Officer briefly and then as QC officer in the maintenance department. He made two operational deployments in VP-22 and in May 1964 was assigned to the staff of Commander, FAW SIX in Iwakuni, Japan where he served as Logistics Officer until September 1966. Prior to being selected as prospective editor of APPROACH magazine LCDR CLARK served as ASO at NAS Brunswick.

Emergency Signal Variations

NAS Lemoore—I am writing in reference to a letter from HC-4 titled "Contingency Helo SAR Signals" in the February issue.

As for the necessity of a set of procedures for "Lost ICS," we are in full agreement. However, the procedure set forth by HC-4 can be improved. Speaking only in reference to the UH-2B, paragraph 2 item (a) states; "Hand must be on the right side and just forward of the pilot's head." This would almost be an impossibility as the crewman would have to lean completely out of the aircraft to place his hand in this position. As to the visual signals to the pilot in cases of a night rescue this would be most difficult.

We here at NAS Lemoore have adopted the following set of "Lost ICS procedures" and have been using them very successfully. Along with the lost ICS, it could be possible to have an electrical power failure which would be the cause of the loss of the ICS. The following procedures allow the crew-

(VA-128), Whidbey Island Naval Air Station, received a flying classroom March 18. It is the new Grumman TC-4C, a trainer version of the *Gulfstream I* turboprop aircraft.

VA-128 trains pilots, bombardier/navigators (BNs) and maintenance personnel for the A-6A *Intruder* attack bomber, the Navy's most sophisticated attack aircraft. Now operating in Vietnam, the crew of this all-weather aircraft, by means of its advanced avionics systems, can navigate in total darkness and destroy ground targets without seeing them visually.

The TC-4C will be used to train A-6A BNs. This new aircraft will make possible improved and accelerated training of A-6A flight crews under realistic flying conditions since two instructors will be able to provide effective inflight instruction to six students in the operation of the complicated A-6A avionics system.

The TC-4C is essentially a *Gulfstream I* turboprop aircraft fitted with an A-6A radome nose which houses the radar antennas. In place of passenger seats, the rear cabin area contains an independent, complete A-6A avionics system consisting of an A-6A training cockpit which accommodates a student pilot and student BN and adjacent instructor's seat. Four additional student radar/computer readout training consoles are linked to the displays of the A-6A cockpit. The pilot and copilot of the TC-4C fly the plane as they would a commercial aircraft while the student BNs in the back are instructed in the interpretation of radar and other displays, and in weapons system operation as if they were in an A-6A.

By providing the Navy efficient and realistic training for six students simultaneously, A-6A flight crew combat effectiveness will be improved, training flight hours will be reduced and more A-6A aircraft will be released for combat.

man to not only direct the pilot but he is also able to operate the manual controls for the hoist located in the cabin overhead.

Lost ICS Procedures for UH-2A/B:

1. The aircrewman will obtain the pilot's attention and point to the relative position of survivor.

2. When pilot is in close proximity to the survivor and hoist boom is not extended, the aircrewman will indicate to the copilot by means of pointing to hoist switch.

3. When sling is on the way down the crewman will then place his hand on the pilot's left shoulder, and indicate the direction in which to move the aircraft by a firm and smooth pressure in the relative direction using the following signals:

a. Forward—steady pressure on pilot's shoulder moving the shoulder forward slightly.
b. Back—Steady pressure on pilot's shoulder moving the shoulder back slightly.
c. Right—Steady pressure on pilot's shoulder moving the shoulder slightly to the right.
d. Left—Steady pressure on pilot's shoulder moving the shoulder slightly to the left.
e. Up—Pull up on pilot's shoulder.
f. Down—Push down on pilot's shoulder.
g. Weight coming on—One tap of crewman's hand on pilot's shoulder.
h. Survivor in aircraft and hoist can be retracted—Two taps on pilot's shoulder.
i. Belay my last—More than three taps on pilot's shoulder.

We also have, as has HC-4, required that each crewman in his standardization check perform a No ICS hoist along with a loss of electrical power.

ADJ-1 (AC) H. E. RADIEL
AIRCREW TRAINING PETTY OFFICER
OPERATIONS MAINTENANCE DEPARTMENT

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CONTENTS

3 A New Look at the Inverted Spin
By CDR D. Z. Skalla

7 The Judgment Factor
By LtCOL F. E. Allgood, USMC

10 Safety School . . . Why Me?
By LTJG S. Evans

12 P-3 Pilot Training
By Jay Beasley

17 Dead Reckoning

18 IFARS

24 Albert's Ripcord

26 Night Vision

30 Five Seconds and OUT!

33 The Ninth Rescue

36 Yellow Sheet Discrepancies

44 When a Lubricant Is Not a Lubricant

DEPARTMENTS

8 On the Glide Slope

22 Anymouse

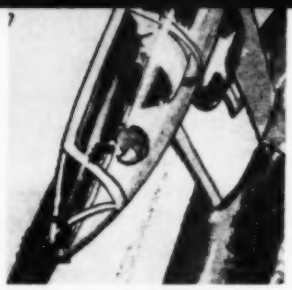
34 Flight Surgeon's Notes

43 Maintenance Notes

45 Murphy's Law

46 Letters

IBC Lift and Drag



NavAir 00-75-510

CREDITS

Cover Painting by Bob Cunningham shows the venerable P2Y's of VP-10 making their historical flight to Hawaii. Courtesy General Dynamics, Fort Worth, Texas.

Pg. 16 Art Courtesy Lockheed-California.

Pg. 35 Cartoon by Ed Graham Courtesy LOOK magazine.

Pg. 41 Photo courtesy Grumman Aircraft Engineering Corp., Bethpage, Long Island, New York.

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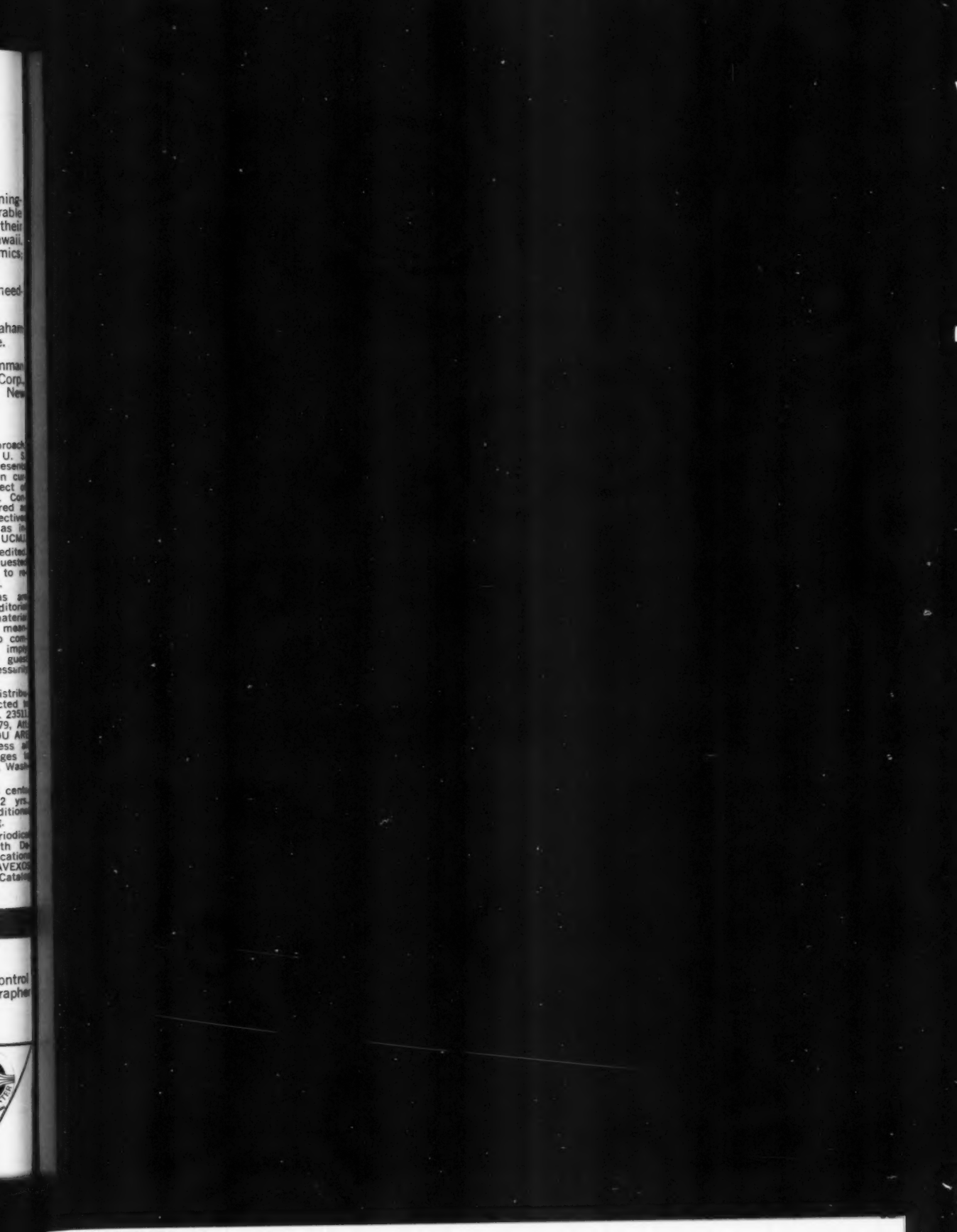
Next Month

Shopping Center for Survival

and other items of interest to the Naval Aviator.



A Lesson Learned

The ground accident described below was something of a freak, but the circumstances surrounding it point up a weak point that may exist in your squadron's safety program.

A 3-M van, under its own power, driverless, backed over 300' at very slow speed until it ran into the fuselage of an aircraft! Why? The old problem of a man in a hurry—too much of a hurry to properly secure the vehicle's ignition and brake. The van was parked near an aircraft and left unattended with the engine running. Though the gear shift appeared to be in PARK it was not fully engaged and vibration helped it slip back into REVERSE. Engine idle was fast enough to back the van across the ramp and into another aircraft.

A point of major interest to all of us grew out of this mishap. In the absence of the safety officer, the CDO arrived on the scene with the Manual for Courts Martial in hand and issued the article 31 warning prior to questioning witnesses or anyone who might have been involved. Consequently, it was extremely difficult during the resulting investigation to determine the positive cause of the accident.

The following passage from OpNavInst 3750.6F is intended for guidance in situations such as this:

"This sole purpose of an accident investigation is to determine all contributory factors involved in Navy mishaps and to obtain information which can be used as a basis for corrective action for the prevention of future mishaps. Witnesses will not testify under oath and will be advised that their testimony (oral or written) will not be used in any legal or punitive action. This assurance is given so as to obtain complete and candid information as to the circumstances surrounding the mishap."

The immunity from self-incrimination that exists during an aircraft accident investigation should be clarified and emphasized for the benefit of all hands.—Ed.

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